EXECUTIVE MEMORANDUM

DATE: MARCH 16, 2000

TO: PACIFIC FISHERIES MANAGEMENT COUNCIL (PFMC)

FROM: ECONOMIC SUBCOMMITTEE – SCIENTIFIC AND STATISTICAL COMMITTEE (SSC)

REGARDING: REPORT ON OVERCAPITALIZATION IN THE WEST COAST GROUNDFISH FISHERY

Attached is our report titled *Overcapitalization in the West Coast Groundfish Fishery: Background, Issues and Solutions*. At the November1999 PFMC meeting, amid SSC discussions regarding the severity of the overcapitalization problem in the groundfish fishery, the SSC Economic Subcommittee volunteered to author a report on the topic. With Council support, the Subcommittee held a two day public workshop on January 13-14, 2000 in Portland to discuss capacity reduction issues and strategies. In addition to Subcommittee members, meeting participants included economists from the NMFS Northwest Region, industry representatives and various members of the Council Family.

The report was designed with three primary objectives: (1) describe and evaluate capacity trends and status of the West Coast groundfish fishery, (2) review alternative programs for reducing and managing fishing capacity, and (3) evaluate a range of alternatives for reducing West Coast groundfish capacity. The report is intended to provide input to the Council as it develops short and long run plans for improving management of the West Coast groundfish fishery. The key findings (which are discussed more fully in Section IV.E of the report) are highlighted below.

Overcapitalization is the single most serious problem facing the West Coast groundfish fishery. The effectiveness of traditional management measures (e.g., landings limits, seasons) in ensuring that discards are minimized and that a reasonable economic livelihood can be made from the groundfish fishery has been seriously eroded in recent years. Given that OYs are unlikely to increase any time soon, the only viable option for reducing overcapitalization is to reduce potential harvest capacity.

The problems associated with overcapacity will not be resolved by waiting for vessels to leave the fishery. The extremely high amount of latent (i.e., unutilized) capacity present in the fishery means that a significant amount of effort is available for mobilization at any sign of improved fishing opportunities. The current problems associated with low landings limits, short seasons and complex and contentious management will not go away unless the Council takes deliberate action to permanently remove latent capacity from the fishery.

There are no quick or easy fixes for the problems caused by excess capacity. Eliminating excess capacity will be complex, costly and time consuming, regardless of which capacity reduction approach or combination of approaches is used. However, the status quo is also complex, costly and time consuming, and provides no solution to excess capacity and its associated problems.

The Council should take immediate action to develop stringent capacity reduction programs for all sectors of the West Coast groundfish fishery. Given the current moratorium on IFQs and the complexities of designing an IFQ system, IFQs are best viewed as a long term management strategy for West Coast groundfish. Other potential solutions, including limited entry for the open access fishery and buyouts and/or permit stacking for the limited entry fishery, should be explored immediately.

As a first step, the Council should establish clear goals and objectives for capacity reduction in each fishery sector. Goals and objectives have a direct bearing on the design of the capacity reduction program and the measures used to monitor program success.

Long term allocation decisions must be made to ensure that capacity reduction represents an acceptable financial risk to those who will pay for it. All capacity reduction approaches require that someone (industry, government or both) bear the financial risks associated with harvest, market and regulatory uncertainties. Allocation of groundfish OYs among fishery sectors (including recreation) will alleviate a major component of that risk.

Spillover effects on other fisheries should not deter the Council from addressing overcapitalization in the groundfish fishery. While scrapping of vessels is highly desirable, it is not clear whether it will be affordable. If vessels are not scrapped, it will be important that the capacity reduction program include design features that discourage spillover to the extent possible. Some spillover, however, will be inevitable, regardless of which capacity reduction approach is adopted (including the status quo). In any case, the groundfish fishery should not be held hostage to inadequate capacity regulation in other fisheries.

An ad hoc committee should be assigned to develop and evaluate "straw man" capacity reduction options for the Council. The committee could explore any number of management options. For instance, the committee could evaluate alternative mandatory permit stacking schemes in terms of their effects on harvest capacity and the landings limit per permit. The committee could analyze the effect of alternative limited entry criteria on the open access fleet. The committee could evaluate the feasibility of obtaining funding for a buyout and how much capacity could be bought out with different levels of funding. ***Council input regarding its capacity reduction objectives and which of the broad range of capacity reduction approaches it is interested in pursuing will be essential for focusing the committee's efforts. Industry involvement will be critical to the success of this endeavor.***

DRAFT REPORT FOR REVIEW

OVERCAPITALIZATION IN THE WEST COAST GROUNDFISH FISHERY:

BACKGROUND, ISSUES AND SOLUTIONS

Economic Subcommittee
Scientific and Statistical Committee
Pacific Fishery Management Council

March 16, 2000

This report was prepared for the Pacific Fishery Management Council by the SSC Economic Subcommittee. It is currently under review by the SSC.

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ACKNOWLEDGEMENTS

Dan Waldeck (PFMC staff member) played a key organizational role in the completion of this document. He handled meeting logistics, prepared meeting minutes, served as the SSC's liaison with the PFMC Strategic Plan Committee and generally provided services beyond the call of duty. Jim Hastie (NMFS/NWFSC), Co-Chair of the PFMC Groundfish Management Team, and Steve Freese (NMFS/NWR) were invited participants at the January 13-14, 2000 meeting at which capacity reduction approaches were explored for West Coast groundfish. Jim Hastie and Kevin Ford (NMFS/NWR) provided much of the fleet information contained in the document, and Kate King (NMFS/NWR) provided information regarding management aspects of the fishery.

ES. EXECUTIVE SUMMARY
ES.A. Trends in the West Coast Commercial Groundfish Fishery

From 1983 to 1999, aggregate commercial shoreside groundfish landings on the West Coast increased by 12% from 108,500 metric tons (mt) to 121,500 mt (Table ES-1, Figure ES-1), while shoreside ex-vessel revenues (in 1999 dollars) decreased by 47% from $100.2 million to $52.9 million (Table ES-2, Figure ES-2). These patterns are the result of two distinct trends: an increase in low-valued whiting landings and a decrease in landings of other higher-priced groundfish species.

The increase in shoreside whiting landings from 21,000 mt in 1991 (when the whiting fishery was Americanized) to over 80,000 mt annually during 1997-1999 contrasts sharply with the decline in the non-whiting fishery. During 1983-1999, non-whiting landings fell by 65% from 107.4 thousand mt to 38.1 thousand mt, while non-whiting revenues fell from by 54% from $99.9 million to $46.2 million. The decline was particularly severe for *sebastes* rockfish and flatfishes, which annually account for 50%-60% of non-whiting groundfish revenues. During 1983-1999, *sebastes* landings fell by 78% and *sebastes* revenues by 69%; flatfish landings fell by 41% and flatfish revenues by 73% (Tables ES-1 and ES-2).

ES.B. Biological and Regulatory Factors Affecting the Fishery

The decline in non-whiting groundfish landings experienced in the early 1990s has accelerated in recent years, as increasingly restrictive management measures have been adopted in response to new scientific information and new statutory requirements. In 1998 the Council changed the F_{msy} proxy for *sebastes* rockfish from $F_{35\%}$ to $F_{40\%}$ on the basis of scientific information suggesting that more stringent harvest restrictions were warranted for those stocks. In 1999, in order to meet provisions of the Sustainable Fisheries Act (SFA), the Council adopted a default harvest rate policy (Groundfish FMP Amendment 11, PFMC 1998) that imposed stringent rebuilding requirements on "overfished" stocks. Under this new policy, formal rebuilding plans were initiated in 2000 for lingcod, bocaccio and Pacific ocean perch, and will be in initiated in 2001 for canary and cowcod. In 2000, the Council changed the F_{msy} proxy from $F_{35\%}$ to $F_{40\%}$ for shortspine thornyhead and from $F_{40\%}$ to $F_{45\%}$ for widow rockfish, on the basis of their low abundance. The Council has also been presented with new scientific information suggesting that the productivity of West Coast groundfish is unusually low relative to other groundfish stocks worldwide. To more fully investigate and evaluate this evidence, the Council's Scientific and Statistical Committee will convene a Harvest Rate Policy Review Workshop in March 2000 to evaluate the appropriateness of the current default F_{spr} values being used by the Council as proxies for F_{msy}.

The declines in abundance observed for many West Coast groundfish stocks have been inadvertently fostered by harvest policies that -- while based on the best scientific information available at the time-- are now thought to contribute to overfishing. New scientific information and new statutory requirements have resulted in much more conservative harvest policies. Given the depressed status of many groundfish stocks, the long periods required to rebuild overfished stocks, and the possibility of additional rounds of OY reductions once the results of the SSC Harvest Rate Policy Review Workshop become available, allowable non-whiting harvests are likely to remain restricted for many years to come.

ES.C. Overcapitalization and Its Effects on the Fishery

In 1994, the Council implemented a limited entry program for the commercial groundfish fishery. Of the vessels that initially qualified for a limited entry permit, 245 held fixed gear endorsements and 384 held trawl endorsements. Currently, the limited entry fleet includes 236 fixed gear endorsements, 264 trawl endorsements held by catcher boats, and 10 catcher-processor permits. The entry of catcher-processors into the fishery, which occurred in 1994-1995, was largely accomplished by the transfer of trawl permits to catcher-processors. The decline in trawl permits and increase in catcher-processor permits have been the only significant change in groundfish fleet configuration since the inception of limited entry.

Potential harvest capacity includes both unutilized (i.e., latent) as well as utilized capacity. Although limited entry has likely had the effect of "freezing" potential harvest capacity at its 1994 level, the low eligibility requirements for limited entry assured that even vessels with marginal involvement in the fishery were eligible for a permit. As a result, a significant proportion of the harvest capacity initially admitted into the fishery consisted of latent capacity. This overcapitalization, which is measured by the difference between potential harvest capacity and available harvest, has been further exacerbated by the severe harvest restrictions of recent years. Current capital utilization rates are exceedingly low for all sectors of the commercial groundfish fishery: 9% and 12% respectively for the sablefish and non-sablefish components of the limited entry fixed gear fishery, 27%-41% for limited entry trawlers who deliver shoreside, and 6%-13% for open access vessels targeting groundfish.

In order to ensure that current fishery participants -- who are capable of expending much more fishing effort than needed to harvest the OYs -- do not exceed the OYs, the Council has drastically reduced cumulative vessel landings limits. Expressed in comparable monthly-equivalent terms, landings limits in the limited entry fishery have declined from 120,000 pounds in the mid-1980s to 13,000 pounds in 2000 for *sebastes* north; 100,000 pounds in the early 1990s to 22,000 pounds in 2000 for *sebastes* south; and 110,000 pounds in the early 1990s to 27,000 pounds in 2000 for the Dover/thornyhead/sablefish complex (Figure ES-3). In the open access fishery, monthly-equivalent *sebastes* limits have fallen from 35,000-40,000 pounds during 1994-1998 to about 5,000 pounds during 1999-2000. The fixed gear sablefish season, which was year-round in the early 1980s, has been reduced to 6-9 days in recent years (Figure ES-4). The sablefish season (with its regular and mop-up components and its three-tiered structure) has also become more complex to administer.

The economic hardship and uncertainty being experienced by the industry is intensifying competition among fishery sectors for access to the resource. Protecting groundfish stocks while ensuring that the burden of conservation measures is distributed equitably among sectors of the fishery is becoming increasingly difficult to accomplish. Even if groundfish OYs were to increase significantly (an unlikely scenario), the latent capacity in the fishery will be mobilized at any sign of improved fishing opportunities. The current problems associated with low landings limits, short seasons and complex regulations will not go away unless latent capacity is permanently removed from the fishery.

ES.D. Comparison of Capacity Reduction Strategies

Table ES-3 qualitatively summarizes the potential effects of alternative groundfish capacity reduction approaches relative to the status quo. The status quo pertains not just to the current state of the fishery under the current management approach but also what will likely occur if the current approach is continued indefinitely into the future. Each approach is described in terms of potential outcomes, that is, outcomes that probably can but will not necessarily be realized, depending on the specific details of the program actually adopted. Although each approach is evaluated in isolation, the eventual goal is to encourage discussion regarding how various approaches could be combined in ways that allow the strengths of one approach to offset the weaknesses of another, and vice versa.

Immediate Feasibility: IFQs are not feasible at this time due to a Congressionally imposed moratorium, although that moratorium may be lifted in 2000. Funding for a government financed buyout is not currently available, and it is uncertain whether such funding will be available in the future. It is also not clear whether industry can afford to fund a buyout, given the low OYs and uncertainty regarding permit prices. Nevertheless IFQs and buyout programs are included in this evaluation, based on the possibility that IFQs will become legal, that an industry buyout will be viable and that a government buyout can be funded.

Groundfish capacity reduction: The status quo will not result in any significant capacity reduction, as permit holders are much more likely to retain or transfer their permits than allow them to lapse, even under current depressed fishery conditions. Limited entry and mandatory permit stacking are "command and control" approaches that can be designed to achieve significant capacity reduction. Given that industry will fund a buyout only if it expects it to result in a profitable fishery, an industry buyout -- if affordable -- can also result in significant capacity reduction. Government funded buyouts, which have typically been used in other fisheries as a source of short term financial relief, can -- given sufficient political will -- be designed to achieve capacity reduction. However, given the difficulty of fully dampening the speculative increase in permit prices that typically accompanies government programs, a government buyout will be less successful at reducing groundfish capacity than a similarly funded industry buyout. A government buyout designed to retire vessels will have a smaller impact on groundfish capacity than a similarly funded government buyout that retires groundfish permits only, since the monetary incentive needed to induce a vessel to retire from all fisheries will be greater than the monetary incentive needed to induce retirement of the vessel's groundfish permit. The success of voluntary permit stacking in achieving capacity reduction is highly uncertain, given the difficulty of predicting the number of vessels that will choose to stack under any given set of circumstances. IFQs are similar in some respects to the cumulative landings limits already used in the groundfish fishery, except that IFQ shares (unlike landings limits) vary across individual vessels. Non-transferable IFQs will produce modest capacity reduction, at best, and only to the extent that the number of vessels receiving initial IFQ allocations is smaller than the number of vessels participating in the fishery under the status quo. Transferable IFQs may produce significant capacity reduction as quota shares are transferred from less to more efficient producers. However, capacity reduction will likely take longer to accomplish with transferable IFQs than with limited entry, buyouts or permit stacking.

Long term groundfish capacity management: Effective long term capacity management requires that industry be provided with incentives to efficiently adjust capacity in response to changes in technology, markets and resources. A necessary condition for facilitating industry adjustments is that the fishing privilege be freely transferable. For this reason, non-transferable IFQs are no more likely to achieve capacity management than the status quo. Transferable IFQs, which allow quota holders to adjust capacity in response to changes in economic and harvest conditions, are well suited to long term capacity management. Programs that regulate inputs (e.g., limited entry, permit stacking, buyouts) rather than outputs are intended, by design, to restrict the ability of permit holders to change the existing level of capacity; they are therefore less conducive to achieving long term capacity management than transferable IFQs. However, an input control program that incorporates transferable permits can still facilitate movement of existing harvest capacity among fishery sectors in response to changing conditions. Input control programs can also contribute to capacity management by incorporating features (e.g., trip limits) that discourage the race for fish and the wasteful capital stuffing resulting thereof.

Economic efficiency and profitability, discards, management costs, monitoring and enforcement costs: The success of a capacity reduction approach in enhancing efficiency and profitability, reducing discards, and reducing management and monitoring/enforcement costs will be correlated with its success in achieving capacity reduction. With regard to the input control approaches described in Table ES-3, government sponsored vessel retirement and voluntary permit stacking will be somewhat likely to enhance groundfish profitability, reduce discards, and reduce management and monitoring/enforcement costs relative to the status quo. Limited entry, mandatory permit stacking and government or industry buyout of groundfish permits will perform even better in each of these respects. With regard to the output control approaches included in the table, non-transferable IFQs will likely produce little change from the status quo and transferable IFQs will produce mixed results. Profitability will be highest with transferable IFQs, since the incentive to race for fish will be replaced with the opportunity and incentive to enhance the value of quota shares. Management costs will be lowest, since transferable IFQs remove the competitive incentive for capital stuffing, allow capacity to adjust to changes in OYs and provide market solutions to allocation issues. However, transferable IFQs will have an uncertain effect on discards, depending on whether the reduction in discards that eventually occurs as quota shares are consolidated among fewer quota holders is offset by the incentive for highgrading. Transferable IFQs also have the potential to generate significant monitoring/enforcement costs, given the need to monitor each IFQ holder's quota availability and quota use, and track quota transfers across individuals. This task becomes particularly burdensome if tracking must be done for individual species caught in multispecies complexes.

Spillover effects: The low cumulative landings limits and other regulatory restrictions that characterize the status quo provide an incentive for existing groundfish permit holders to seek alternative opportunities in non-groundfish fisheries. Limited entry, voluntary or mandatory permit stacking, and government or industry funded buyout of groundfish permits all have the potential to exclude some groundfish participants, who will subsequently become fully committed to non-groundfish fisheries. Conversely, however, those who remain in the fishery may be more likely to specialize in groundfish and less likely to diversify into other fisheries. Given the difficulty of predicting the spillover effects associated with these capacity reduction approaches relative to the status quo, they are considered to be indistinguishable for purposes of the table. Government funded vessel retirement will result in less spillover than any other approaches, since it removes vessels from other fisheries as well as groundfish. IFQs, because they allow quota holders to time their groundfish harvests to enhance their fishing opportunities in non-groundfish fisheries, will provide greater opportunity for spillover than the other approaches.

ES.E. Conclusions and Recommendations

The current problems associated with low landings limits, short seasons and complex and contentious management will not go away unless the Council takes deliberate action to permanently remove latent capacity from the groundfish fishery. Eliminating excess capacity will be complex, costly and time consuming, regardless of which capacity reduction approach or combination of approaches is used. However, the status quo is also complex, costly and time consuming, and provides no solution to excess capacity and its associated problems.

The need to address groundfish overcapacity is urgent. Potential solutions -- including limited entry, buyouts and permit stacking -- should be subject to immediate consideration. Given the current moratorium on IFQs and the potentially complex design requirements of IFQ systems, IFQs are best viewed as a long term management strategy for West Coast groundfish.

The Council should establish clear goals and objectives for capacity reduction in each fishery sector, and should incorporate design features into the program that provide a realistic basis for achieving those objectives. The Council should consider using different capacity reduction approaches for different sectors of the fishery, and also consider combinations of approaches that allow the strengths of one approach to offset the weaknesses of another, and vice versa.

While achieving an immediate reduction in capacity is critical, it is equally critical that the Council address the fundamental cause of overcapacity. This will require development of management approaches that end the race for fish and provide incentives for industry to adjust capacity in response to changes in technology, markets and the resource.

Resolution of the capacity problem will require that a number of related issues be addressed.

- ***Long term allocation decisions must be made to ensure that the benefits of capacity reduction accrue to those who bear the costs.***

- ***Spillover effects on other fisheries, while a legitimate and serious concern, are not an adequate justification for ignoring the overcapitalization problem in the groundfish fishery.*** Spillover effects should be mitigated to the extent possible. However, groundfish should not be held hostage to inadequate capacity regulation in other fisheries.

Table ES-1 . Commercial shoreside groundfish landings (metric tons), by state and year, 1983-1999.[1]

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sebastes Rockfish:																	
WA	11,834	7,060	6,343	8,128	8,960	9,273	8,421	6,800	5,351	4,852	5,608	4,169	3,935	3,581	2,457	2,091	1,697
OR	15,254	12,227	11,980	11,095	13,910	14,105	15,847	12,445	12,462	13,069	14,858	11,862	10,002	10,602	8,441	7,148	6,067
CA	18,399	17,551	14,911	14,164	21,638	17,573	17,062	16,536	15,612	14,845	12,407	7,494	8,048	7,453	7,284	6,727	2,369
Total	45,487	36,838	33,234	33,387	44,508	40,951	41,330	35,781	33,425	32,766	32,873	23,525	21,985	21,636	18,182	15,966	10,133
Thornyheads:																	
WA	118	253	56	25	63	69	131	156	134	214	604	685	580	430	365	162	84
OR	835	795	1,117	673	727	1,043	2,553	4,529	3,506	4,281	4,460	4,043	3,336	2,786	2,326	1,460	1,058
CA	1,711	2,126	2,940	2,950	3,697	4,939	6,549	7,044	4,398	7,092	6,119	3,316	3,634	3,313	1,597	1,908	1,308
Total	2,664	3,174	4,113	3,648	4,487	6,051	9,233	11,729	8,038	11,587	11,183	8,044	7,550	6,529	4,288	3,530	2,450
Flatfish:																	
WA	5,529	6,284	6,025	4,177	5,115	4,704	6,190	7,045	5,706	3,668	3,119	3,060	2,388	3,641	2,648	2,773	4,143
OR	12,456	8,830	8,628	7,368	9,074	10,564	12,381	11,326	14,042	10,418	10,485	7,562	7,074	8,553	7,192	7,092	8,457
CA	11,648	12,586	15,786	14,583	14,679	11,774	11,326	9,328	10,767	10,719	8,490	6,923	8,755	9,328	8,375	5,561	4,826
Total	29,633	27,700	30,439	26,128	28,868	27,042	29,897	27,699	30,515	24,805	22,094	17,545	18,217	21,522	18,215	15,426	17,426
Sablefish:																	
WA	3,363	4,413	3,869	2,415	3,144	2,938	2,416	1,724	2,237	1,790	1,713	1,388	1,951	1,947	2,036	1,159	1,688
OR	4,641	4,835	5,275	4,653	5,238	4,082	3,948	3,705	3,906	3,856	3,835	4,005	3,133	3,175	2,925	1,750	2,967
CA	6,694	4,826	5,171	6,220	4,404	3,856	4,075	3,750	3,353	3,714	2,597	2,186	2,818	3,195	2,967	1,436	1,653
Total	14,698	14,074	14,315	13,288	12,786	10,876	10,439	9,179	9,496	9,360	8,145	7,579	7,902	8,317	7,928	4,345	6,308
Lingcod:																	
WA	1,524	2,043	2,130	714	1,023	757	1,137	993	892	561	676	477	278	360	290	38	41
OR	1,734	1,057	1,052	656	717	1,004	1,174	874	1,486	708	833	859	649	717	767	161	174
CA	898	951	695	524	812	867	1,257	1,064	788	613	685	568	539	479	480	149	131
Total	4,156	4,051	3,877	1,894	2,552	2,628	3,568	2,931	3,166	1,882	2,194	1,904	1,466	1,556	1,537	348	346
Other Non-Whiting:																	
WA	543	791	672	436	1,718	2,522	1,722	1,311	2,123	2,415	2,111	2,019	741	1,348	957	961	633
OR	173	127	86	66	681	1,070	841	333	706	622	901	647	616	7,942	4,055	1,663	278
CA	10,082	9,367	7,111	4,984	8,290	5,283	10,906	3,397	1,867	1,561	2,216	3,423	2,345	2,930	2,717	2,037	489
Total	10,798	10,285	7,869	5,486	10,689	8,875	13,469	5,041	4,686	4,598	5,228	6,089	3,702	12,220	7,729	4,661	1,400

Table ES-1 (cont)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All Non-Whiting																	
WA	22,911	20,844	19,095	15,895	20,023	20,263	20,017	18,029	16,443	13,500	13,831	11,798	9,873	11,307	8,753	7,184	8,286
OR	35,093	27,871	28,138	24,511	30,347	31,868	36,744	33,212	36,108	32,954	35,372	28,978	24,810	33,775	25,706	19,274	19,001
CA	49,432	47,407	46,614	43,425	53,520	44,292	51,175	41,119	36,785	38,544	32,514	23,910	26,139	26,698	23,420	17,818	10,775
Total	107,436	96,122	93,847	83,831	103,890	96,423	107,936	92,360	89,336	84,998	81,717	64,686	60,822	71,780	57,879	44,276	38,062
Shoreside Whiting:																	
WA	6	47	14	61	95	88	27	302	504	2,237	3,188	4,884	4,037	10,905	7,241	10,513	9,099
OR	65	338	885	420	183	246	89	2,294	13,643	48,961	35,820	65,110	66,840	62,991	70,875	71,626	73,012
CA	980	2,335	2,996	2,982	4,518	6,533	7,298	5,519	6,893	4,930	3,100	3,613	4,091	2,901	6,332	5,723	1,308
Total	1,051	2,720	3,895	3,463	4,796	6,867	7,414	8,115	21,040	56,128	42,108	73,607	74,968	76,797	84,448	87,862	83,419
All Groundfish Species:																	
WA	22,917	20,891	19,109	15,956	20,118	20,351	20,044	18,331	16,947	15,737	17,019	16,682	13,910	22,212	15,994	17,697	17,385
OR	35,158	28,209	29,023	24,931	30,530	32,114	36,833	35,506	49,751	81,915	71,192	94,088	91,650	96,766	96,581	90,900	92,013
CA	50,412	49,742	49,610	46,407	58,038	50,825	58,473	46,638	43,678	43,474	35,614	27,523	30,230	29,599	29,752	23,541	12,083
Total	108,487	98,842	97,742	87,294	108,686	103,290	115,350	100,475	110,376	141,126	123,825	138,293	135,790	148,577	142,327	132,138	121,481

[1] Sources: 1983-1998 data obtained from PFMC (1999a; pp. T-13, T-15 and T-17). 1999 data obtained from PacFIN state reports as of January 26, 2000 and are preliminary.

Table ES-2 . Ex-vessel value of commercial shoreside groundfish landings ($1000s, base year=1999), by state and year, 1983-1999.[1]

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sebastes Rockfish:																	
WA	8,225	5,025	5,187	7,171	8,939	7,758	6,340	5,040	4,173	3,833	4,167	3,445	3,403	2,809	1,951	1,755	1,498
OR	10,597	9,461	9,739	9,832	13,916	11,815	11,902	9,183	9,745	10,100	11,127	9,307	8,397	8,320	6,703	6,440	5,703
CA	16,365	16,419	15,658	16,384	25,029	19,144	18,216	17,445	16,538	16,274	13,782	9,487	10,231	9,155	8,742	7,933	3,714
Total	35,186	30,905	30,583	33,387	47,884	38,717	36,458	31,669	30,456	30,207	29,076	22,238	22,032	20,283	17,396	16,128	10,915
Thornyheads:																	
WA	89	175	45	23	61	67	123	140	149	217	624	1,078	1,289	813	600	229	138
OR	616	627	898	596	724	1,074	2,644	4,725	4,106	4,694	4,894	6,900	7,762	5,512	3,935	2,114	1,787
CA	1,372	1,739	2,375	2,576	3,650	5,119	6,852	7,317	5,233	8,733	7,636	6,062	8,847	6,830	2,952	3,344	2,716
Total	2,077	2,541	3,318	3,196	4,434	6,259	9,619	12,182	9,488	13,644	13,153	14,040	17,897	13,155	7,487	5,687	4,641
Flatfish:																	
WA	6,879	4,754	4,634	3,250	4,915	4,322	4,512	3,980	3,529	2,418	2,100	1,776	1,915	2,058	1,679	1,680	1,836
OR	18,914	8,575	8,098	7,593	10,182	11,058	11,040	9,012	11,812	7,733	7,554	5,554	6,001	6,316	5,609	5,509	5,881
CA	17,467	11,394	14,512	13,965	15,669	12,324	10,699	8,148	9,701	8,726	6,736	6,007	7,699	7,924	6,927	4,958	4,073
Total	43,260	24,724	27,244	24,808	30,766	27,704	26,251	21,140	25,041	18,877	16,390	13,337	15,615	16,298	14,215	12,148	11,790
Sablefish:																	
WA	3,035	3,668	6,177	3,848	6,258	6,150	4,253	3,213	6,542	4,376	3,412	3,321	7,508	7,425	8,754	3,336	5,012
OR	3,526	3,278	4,978	5,140	7,015	5,941	4,918	4,280	5,988	6,200	5,005	8,043	9,741	10,575	10,492	4,683	7,683
CA	5,492	3,336	4,214	6,620	5,265	4,561	4,630	4,345	4,358	5,063	2,768	3,661	7,759	9,097	9,319	3,407	3,578
Total	12,053	10,283	15,368	15,608	18,539	16,651	13,802	11,839	16,889	15,638	11,185	15,025	25,008	27,096	28,566	11,426	16,273
Lingcod:																	
WA	1,287	1,582	1,718	663	1,131	739	1,006	869	785	524	579	433	282	362	274	47	52
OR	1,489	882	882	631	827	1,063	1,114	800	1,276	660	748	824	652	722	808	255	290
CA	798	834	669	588	978	1,017	1,408	1,138	833	671	730	640	652	597	569	275	261
Total	3,575	3,298	3,269	1,882	2,936	2,819	3,527	2,807	2,895	1,855	2,056	1,897	1,585	1,681	1,651	577	603
Other Non-Whiting:																	
WA	425	468	377	303	1,620	1,847	1,148	793	1,311	1,492	1,088	1,006	493	468	622	510	360
OR	147	107	80	63	685	858	606	202	466	483	513	287	255	313	548	434	178
CA	3,134	2,485	2,285	1,553	2,033	1,351	2,273	744	488	494	700	986	1,143	2,672	1,951	1,905	1,399
Total	3,706	3,061	2,752	1,919	4,337	4,056	4,027	1,739	2,264	2,469	2,301	2,279	1,891	3,454	3,121	2,849	1,936

Table ES-2 (cont.)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All Non-Whiting:																	
WA	19,941	15,673	18,138	15,258	22,923	20,883	17,381	14,035	16,488	12,860	11,970	11,060	14,889	13,934	13,881	7,557	8,896
OR	35,290	22,931	24,675	23,854	33,348	31,809	32,224	28,203	33,393	29,869	29,841	30,915	32,808	31,757	28,096	19,435	21,522
CA	44,627	36,208	39,722	41,687	52,624	43,515	44,079	39,138	37,151	39,961	32,352	26,842	36,330	36,275	30,459	21,824	15,741
Total	99,858	74,812	82,535	80,798	108,896	96,207	93,684	81,376	87,003	82,691	74,162	68,817	84,027	81,967	72,436	48,815	46,159
Shoreside whiting:																	
WA	0	9	3	11	25	25	6	56	94	240	235	276	388	755	733	609	748
OR	50	89	270	80	47	55	19	268	1,689	5,824	2,558	4,693	7,468	4,343	6,731	3,826	5,918
CA	254	515	578	547	844	1,434	1,345	961	1,040	685	383	386	486	250	599	401	116
Total	304	613	852	638	916	1,514	1,370	1,285	2,823	6,749	3,176	5,356	8,343	5,348	8,063	4,835	6,782
All Groundfish Species:																	
WA	19,941	15,682	18,141	15,269	22,948	20,908	17,388	14,091	16,583	13,100	12,204	11,336	15,278	14,689	14,614	8,165	9,644
OR	35,340	23,020	24,945	23,934	33,395	31,864	32,243	28,472	35,082	35,693	32,399	35,608	40,276	36,100	34,826	23,261	27,440
CA	44,881	36,723	40,301	42,233	53,468	44,949	45,424	40,098	38,191	40,646	32,735	27,228	36,817	36,525	31,059	22,225	15,857
Total	100,162	75,425	83,386	81,436	109,812	97,721	95,054	82,661	89,855	89,440	77,338	74,172	92,370	87,315	80,499	53,650	52,941

[1] Sources: 1983-1998 data obtained from PFMC (1999a; pp. T-14, T-16, T18). 1999 data obtained from PacFIN state reports as of January 26, 2000 and are preliminary. All values corrected to 1999 dollars using the Implicit Price Deflator for Gross Domestic Product.

Table ES-3. **Potential** effects of alternative capacity reduction approaches **relative to the status quo**.[1]

	Immediate Feasibility	Groundfish Cap Reduction	Long Term Groundfish Cap Mgmt[2]	Economic Efficiency and Profitability	Groundfish Discards	Groundfish Management Costs	Gr Monitoring &Enforcement Costs	Spillover Effects
Status Quo	YES	NONE	NONE	LOW	HIGH	HIGH	HIGH	SOME
Govt Buyout (Vessel Retirement)[3]	Maybe	Some	Some	Somewhat higher	Somewhat lower	Somewhat lower	Somewhat lower	Lower
Govt Buyout (Gr Permits Only)[3]	Maybe	More	Some	Higher	Lower	Lower	Lower	Same as status quo
Industry Buyout (Gr Permits Only)[3]	Maybe	Most	Some	Higher	Lower	Lower	Lower	Same as s.q.
Limited Entry	Yes	Most	Some	Higher	Lower	Lower	Lower	Same as s.q.
Permit Stacking (Mandatory)	Yes	Most	Some	Higher	Lower	Lower	Lower	Same as s.q.
Permit Stacking (Voluntary)	Yes	Some	Some	Somewhat higher	Somewhat lower	Somewhat lower	Somewhat lower	Same as s.q.
IFQs (Non-transferable)	No	None/some	Same as status quo	Same as s.q.	Same as s.q.	Same as s.q.	Same as s.q.	Higher
IFQs (Transferable)	No	Most (not immediate)	Most	Highest	Don't know	Lowest	Higher	Higher

Table ES-3 (cont.)

[1] Each capacity reduction option is described relative to the status quo. The status quo pertains not just to the current state of the fishery under the current management approach but also what will likely occur if the current approach is continued indefinitely into the future. All effects are described as "potential" to highlight the fact that they probably can but will not necessarily be realized, depending on the specific details of the program actually adopted.

[2] "Long term capacity management" refers to effectiveness of capacity reduction program in providing incentives for industry to efficiently adjust capacity in response to long term changes in technology, markets and resources.

[3] The evaluation of buyout programs reflects what would occur if a similar amount of money were available for each type of buyout.

1I. INTRODUCTION

The problem of excess capacity[1] is widespread in U.S. and international marine fisheries, attracting particular attention in the past decade. In the U.S., all of the regional fishery management councils are engaged in discussions of this problem and approaches to its solution. Thus the problem of overcapacity in West Coast groundfish fisheries occurs within a policy and economic context that is common to many fisheries.

I.A. The Policy Context

The U.S. is a party to international agreements related to fishing capacity. The Code of Conduct for Responsible Fisheries, developed by the United Nations Food and Agriculture Organization (FAO), requires that all parties to the agreement develop implementation plans for reducing capacity in their fisheries (NMFS 1997a). An international plan of action directs all FAO member nations to assess capacity levels in their fisheries. To this end, the National Marine Fisheries Service (NMFS) is co-sponsoring with FAO a technical experts consultation on defining, measuring and managing fishing capacity (Dalton letter 2000).

The 1996 Sustainable Fisheries Act (SFA), which amended the Magnuson Fishery Conservation and Management Act, mandated several actions related to capacity in U.S. federally managed fisheries. It directed the Secretary of Commerce to form a task force to address the effect of government policies on capital investment and capacity in fisheries. The Federal Fisheries Investment Task Force submitted a report to Congress in July 1999 (Federal Fisheries Investment Task Force 1999), concluding that federal investment in fisheries has had a direct role in capital formation and capacity in some U.S. fisheries.

The SFA placed a moratorium until October 2001 on the issuance of new government loans for fishing vessel construction that increased fishing capacity, and proposed the creation of a standardized fishing vessel registration and information management system. The Act directed the Government Accounting Office (GAO) to conduct a study of the effectiveness of buyout programs in reducing fishing capacity, and ordered the creation of a Capacity Reduction and Financing Authority to guarantee debt obligations incurred in capacity reduction (NMFS 1996; NMFS 1997a). The GAO has initiated its evaluation of vessel buyout programs -- including programs implemented in the Northeast fisheries and in the salmon troll, gillnet and charterboat fisheries in the Northwest.

The SFA also placed a four-year moratorium (until October 1, 2000) on the development of new individual fishing quota (IFQ) programs, and mandated an assessment of IFQ performance by the National Research Council (NRC). Market transfer of IFQs generates

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[1] Although, strictly speaking, the term "capacity" pertains to all inputs (labor, capital, etc.) used to harvest groundfish, the terms "capacity" and "capitalization" are used loosely and interchangeably in this paper to refer to the harvest capacity of fishing vessels.

capacity reduction as quota share is consolidated among fewer vessels, which then operate at a higher level of capacity utilization. Thus, while some provisions of the SFA attempt to address concerns regarding overcapacity, the IFQ moratorium eliminates from consideration one major management approach to achieving capacity reduction. In 1999 the NRC, in recognition of the role IFQs can play in reducing capacity, recommended that the moratorium on the development of IFQ programs be lifted (NRC 1999).

A number of other completed or ongoing activities at the national level are also indicative of the growing concern regarding overcapacity in U.S. fisheries. The Congressional Research Service produced an assessment of economic and capacity reduction in commercial fisheries (Read and Buck 1997). One of the objectives contained in the NOAA Fisheries Strategic Plan is to reduce by 15% the number of federally managed fisheries with excess capacity by FY 2004 (NMFS 1997b). As intermediate steps toward achieving this goal, NMFS has convened a National Excess Capacity Task Force to explore alternative definitions of capacity and alternative approaches to measuring it (National Excess Capacity Task Force 1999) and is coordinating an effort to develop estimates of capacity for all federally managed fisheries (Dalton 1999). The Marine Fisheries Advisory Committee, which advises the Undersecretary of Commerce for Oceans and Atmosphere, has recently formed a Capacity Subcommittee to provide advice on various aspects of the overcapacity problem.

I.B. The Economic Context

The economic context of overcapacity pertains to the conditions and incentives that lead to overinvestment in unregulated fisheries. When individual fishermen can claim ownership to fish only on capture, they have little incentive to restrain their harvest rates, since what is not taken by one individual will be taken by others. Thus a race for fish is created, in which fishermen have an incentive to invest in more and bigger boats, to enhance inputs used on board their boats (e.g., electronics, fishing gear) and to modify fishing practices in ways that enable them to catch as much fish as quickly as possible. Competition of this type is ultimately detrimental to all fishery participants, since any short term advantage gained by such behavior eventually dissipates as other vessels take similar actions. The race leads to repetitive and wasteful rounds of investment in order to catch the same amount of fish.[2] It is this kind of incentive that has lead to overcapitalized fisheries around the world.

Uncertainties associated with biological, environmental and regulatory conditions motivate fishermen to diversify their fishing operations and invest in multipurpose fishing capital in order to better adapt to changing fishery conditions. Opportunities for diversification are greatest when fisheries are open access. However, as indicated earlier, unregulated open access fisheries are highly susceptible to the wasteful investment and dissipation of economic benefits

[2] It is important to distinguish investments associated with the race for the fish, which are wasteful in the long run, from other types of investment that enhance efficiency and cost-effectiveness.

associated with the race for fish. Thus fishery management measures that effectively prevent or reduce overcapitalization also reduce opportunities for those excluded from the fishery to alleviate the financial risks associated with operating in an uncertain fisheries environment.

Regulations that control aggregate output (e.g., a total quota), while useful for protecting the resource from overexploitation, tend to intensify the race for fish, as fishermen compete against the clock to augment their harvest before the quota is exhausted. Regulations on inputs such as numbers of vessels, time spent fishing or fishing gear -- if sufficiently restrictive -- may hamper the ability of fishermen to race for fish; however, they do not remove the incentive to continue the race. Harvest rates will creep up over time as fishermen develop innovations that enhance the effectiveness of unrestricted inputs. Regulations that allocate the allowable harvest among individual fishery participants eliminate the incentive to race for fish. However, these types of regulations have drawbacks as well as benefits (to be discussed later in this report) that need to be considered in evaluating their suitability for a particular fishery.

I.C. The Structure of the Report

This report on capacity reduction approaches for the West Coast groundfish fishery reflects the policy and economic contexts of overcapacity.

Section II presents the capacity situation in West Coast groundfish. It describes the past 17 years of fishery trends in landings, revenues, biological productivity and regulations. This is followed by a discussion of Amendment 6 (limited entry) to the Groundfish Fishery Management Plan, including original limited entry provisions and changes in the limited entry fleet since program implementation in 1994. The section next compares existing commercial harvest capacity to allowable harvest levels for the limited entry fixed gear, limited entry trawl and open access fleets. Finally, the effects of overcapacity on landings, limits, season length and the costs of management are assessed.

Section III reviews capacity reduction programs worldwide. The review focuses on key elements of these programs, including their design characteristics, short term and long term effects, and relevance to capacity reduction in West Coast groundfish management.

Section IV is a strategic analysis of alternative capacity reduction approaches for the West Coast groundfish fishery. The analysis identifies capacity reduction alternatives and their likely outcomes. Alternative approaches include the status quo, limited entry (over and above existing groundfish limited entry requirements), buyouts, permit stacking and IFQs. Each approach is assessed relative to the status quo for a number of different effects: immediate feasibility, capacity reduction, long term capacity management, economic efficiency, discards, management costs, monitoring and enforcement costs, and spillover to other fisheries. Conclusions are drawn regarding the importance of capacity reduction, the likely outcomes of failing to reduce capacity in West Coast groundfish, the alternatives available to the Pacific Fishery Management Council, and practical considerations in designing capacity reduction options.

II. NEED FOR CAPACITY REDUCTION IN THE WEST COAST GROUNDFISH FISHERY

II.A. General Trends in the Fishery 1983-1999

In 1982, the Pacific Fishery Management Council adopted a Fishery Management Plan (FMP) for the groundfish fishery (PFMC 1982). The FMP covers 55 rockfishes (52 *sebastes* stocks, shortspine and longspine thornyheads, California scorpionfish), 12 flatfishes (Dover, English, petrale and other soles, arrowtooth and starry flounder, Pacific sanddab), seven roundfishes (e.g., Pacific whiting, lingcod, sablefish, Pacific cod),[3] and nine other fish stocks (e.g., sharks, skates, ratfish, morids, grenadiers).

Pacific coast groundfish stocks are harvested in multispecies complexes and by a diversity of user groups. Commercial groundfish fishing vessels utilize a variety of gear types and fishing strategies. For instance, pot gear is used to target sablefish, and longline gear to target sablefish, rockfish and lingcod. Trawl gear of various types is used to target particular species mixes: bottom trawl for deepwater slope species such as Dover sole, thornyheads, sablefish and arrowtooth flounder; roller trawl for bottom rockfishes; mud gear for nearshore mixed flatfishes; and midwater trawl for widow rockfish and Pacific whiting. Non-whiting groundfish harvests are made almost exclusively by catcher boats delivering to shoreside processors. Whiting harvests, however, are made by a broader range of participants, including catcher boats that deliver to offshore motherships as well as shore-based processors, and offshore catcher-processors. Landings by groundfish vessels are not limited to targeted species, since other types of fish are also taken in the course of targeting particular groundfish stocks. Groundfish are also harvested incidentally in non-groundfish fisheries, most notably the trawl fisheries for pink shrimp, spot/ridgeback prawns, California halibut and sea cucumber.

Groundfish are also taken by marine sport anglers coastwide and by Indian treaty tribes on the Washington coast. The recreational harvest, consisting mainly of rockfish and lingcod, is taken largely by commercial passenger fishing vessels and private boats. Most of the tribal harvest consists of sablefish and Pacific whiting. The tribal set-aside of sablefish, which was 300 metric tons (mt) during 1990-1994, was changed in 1995 to 10% of the allowable sablefish harvest in the Monterey to Vancouver management areas. The tribal set-aside of whiting, which was first established in 1996, was 15,000 mt in 1996, 25,000 mt in 1997-1998 and 32,500 mt in 1999. The next section discusses non-tribal commercial landings, which are the major component of the groundfish fishery.

II.A.1. Landings, Revenues and Prices

The first major development in the commercial groundfish fishery on the West Coast occurred in 1966, when foreign factory trawlers began targeting groundfish in the U.S. Exclusive

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[3] Jack mackerel, which was one of the seven roundfishes included in the original Groundfish FMP, was moved to the Council's Coastal Pelagics FMP in 1999.

Economic Zone (EEZ). In 1978 two U.S. catcher boats entered into joint venture fishing with Soviet factory trawlers operating as motherships, and by 1982 the joint venture catch exceeded the foreign catch. In 1989, Japanese motherships developed a process for producing surimi from whiting, and the whiting OY has been fully utilized ever since. In 1990 several U.S. catcher-processors did some exploratory whiting fishing in the EEZ. By the following year the fishery had become completely Americanized, with participation by catcher-processors, catcher boats delivering to shoreside processors, and catcher boats delivering to motherships (Table II-1).

Since Americanization of the whiting fishery, harvests made by the different sectors of the fishery have varied, depending on the overall level of allowable harvest, the harvesting/processing capability of each sector and the amount of whiting allocated to each sector. Catcher-processors, whose large-scale harvesting and processing capabilities had already been developed in the course of their participation in the Alaska pollock fishery, dominated the whiting harvest during 1991-1993. However, the expansion of shoreside surimi processing capacity during the early1990s allowed shoreside processors to take full advantage of their harvest allocation by the mid-1990s, and the shoreside sector has dominated whiting harvests since 1995 (Table II-1).

Aggregate shoreside groundfish landings increased by 12% from 108,500 metric tons (mt) in 1983 to 121,500 mt in 1999 (Table II-2), while ex-vessel revenues (in 1999 dollars) decreased by 47% from $100.2 million to $52.9 million over the same period (Table II-3). These patterns are the result of two distinct trends: an increase in low-valued whiting landings and a decrease in landings of other higher-priced groundfish species.

<u>Landings:</u> The Americanization of the whiting fishery in 1991 was followed by fairly rapid development of shoreside surimi processing capacity. Annual whiting landings were 21,000 mt in 1991, 42,000-56,000 mt during 1992-1993, 74,000-77,000 mt during 1994-1996 and 83,000-88,000 mt during 1997-1999. By contrast, non-whiting landings declined by 65% from 107,400 mt in 1983 to 38,100 mt in 1999. Thornyhead landings, which were 2,700 mt in 1983, exceeded 11,000 mt in 1990, 1992 and 1993, then declined to 2,500 mt in 1999. Landings of other major non-whiting groundfish stocks declined significantly during 1983-1999. Sablefish landings fell by 57% from 14,700 mt to 6,300 mt, flatfish landings by 41% from 29,600 mt to 17,400 mt, and *sebastes* rockfish landings by 78% from 45,500 mt to 10,100 mt (Table II-2, Figure II-1). Although *sebastes* and (to a lesser extent) flatfish were the major components of groundfish landings during the 1980s, whiting has dwarfed landings of all other groundfish species since the whiting fishery was Americanized in 1991 (Figure II-2).

<u>Ex-Vessel Prices (in1999 dollars):</u> Ex-vessel prices are much lower for whiting than for other groundfish stocks. Since the whiting fishery was Americanized in 1991, whiting prices have ranged from $55 to $134 per mt. Flatfish and *sebastes* prices, which were quite stable and similar during the 1980s,

diverged during the 1990s; *sebastes* prices now consistently exceed flatfish prices. Prices of thornyheads and sablefish have followed an upward trend throughout the 1980s and 1990s. Over the past decade, these latter species have consistently been the highest-priced components of groundfish harvest. The exceptionally large increases in thornyhead and sablefish prices experienced in the mid-to late-1990s were driven by a strong Japanese market, although these prices have more recently softened as a result of deteriorating conditions in the Japanese economy. In 1999, ex-vessel prices per mt were $2580 for sablefish, $1894 for thornyheads, $1077 for *sebastes*, $677 for flatfishes and $81 for whiting (Figure II-3).

Ex-Vessel Revenues (in 1999 dollars): Despite the high volume of whiting landings, low prices have made whiting a modest source of groundfish revenue. Whiting revenues, which peaked at $8.3 million in 1995, fell to $6.8 million by 1999. Non-whiting revenues declined by 54% from $99.9 million in 1983 to $46.2 million in 1999. During 1983-1999, *sebastes* revenues declined by 69% from $35.2 million to $10.9 million, and flatfish revenues fell by 73% from $43.3 million to $11.8 million. Thornyhead revenues increased from $2.1 million in 1983 to a high of $17.9 million in 1995, then declined to $4.6 million by 1999. Sablefish revenues varied from $10.3 million to $18.5 million during 1983-1994, increased significantly to $25.0 million-$28.6 million during 1995-1997 and subsequently declined to $11.4 million-$16.3 million during 1998-1999 (Table II-3, Figure II-4) . Although *sebastes* was the largest single source of groundfish revenue during the 1980s and early 1990s, declining *sebastes* landings and record high sablefish prices have made sablefish the major revenue source in recent years (Figure II-5).

The species composition of groundfish landings and revenues varies among the West Coast states and also over time within each state. California consistently dominated non-whiting landings and revenues during the 1980s and early 1990s. However Oregon has been dominant in a number of recent years, including 1999. Non-whiting landings and revenues have been consistently lower in Washington than in either of the other two states (Tables II-2 and II-3, Figures II-6 and II-7).

Since 1992, Oregon has annually accounted for 80%-90% of total shoreside whiting landings. During 1991-1999, whiting landings and revenues increased in Washington as well as Oregon (though on a much more modest scale in Washington). California's whiting landings and revenues were higher than Washington's during 1983-1995 but have been lower than Washington's since 1996 (Tables II-2 and II-3, Figures II-8 and II-9).

Additional trends within each state can be described as follows:

Washington: During 1983-1999, total groundfish landings in Washington decreased by 24% from 22,900 mt to 17,400 mt, and groundfish revenues decreased by 52% from $19.9 million to $9.6 million. The non-whiting component of groundfish landings fell by 64% from 22,900 mt to 8,300 mt, and non-whiting revenues fell by 55% from $19.9 million to $8.9 million. At the species level, some of the more significant features of the fishery are: (1) the 86% decline in *sebastes* landings from 11,800 mt to 1,700 mt and the 82% decline in *sebastes* revenues from $8.2 million to $1.5 million during 1983-1999; (2) the 50% decline in sablefish landings from 3,400 mt to 1,700 mt during 1983-1999; (3) the exceptionally high sablefish prices during 1995-1999; and (4) the increase in whiting landings from 2,200 mt in 1992 (following Americanization of the whiting fishery) to 9,100 mt in 1999 (Tables II-2 and II-3, Figures II-10 and II-11)

Sebastes was the largest component of groundfish harvest and revenues during the 1980s. However, during the 1990s, whiting has been the dominant source of landings and sablefish the dominant source of revenues. In 1999, the major contributors to landings were whiting (52%), flatfishes (24%), *sebastes* (10%) and sablefish (10%), while the largest contributors to revenue were sablefish (52%), flatfishes (19%), *sebastes* (16%) and whiting (8%)(Tables II-2 and II-3, Figures II-12 and II-13).

Oregon: Although Oregon's total groundfish landings increased during 1983-1999 from 35,200 mt to 92,000 mt, total groundfish revenues declined by 22% from $35.3 million to $27.4 million. The non-whiting component of groundfish landings declined by 46% from 35,100 mt to 19,000 mt, and non-whiting revenues fell by 39% from $35.3 million to $21.5 million. At the species level, some of the more significant features of the fishery are: (1) the 60% decline in *sebastes* landings from 15,300 mt to 6,100 mt and the 46% decline in *sebastes* revenues from $10.6 million to $5.7 million during 1983-1999; (2) the exceptionally high sablefish prices during 1995-1999; and (3) the increase in whiting landings from 36,000-49,000 mt during 1992-1993 to 63,000-67,000 mt during 1994-1996 and 71,000-73,000 mt during 1997-1999. Despite the sizeable contribution of whiting to total groundfish landings, whiting revenues have not been sufficient to offset the decline in non-whiting revenues (Tables II-2 and II-3, Figures II-14 and II-15).

Relative to other species, *sebastes* and, to a lesser extent, flatfishes were the largest components of groundfish harvest and revenue during the 1980s. However, whiting has dominated landings since 1991. The decline in *sebastes* and flatfish landings, increase in sablefish landings, and increase in thornyhead and sablefish prices during the 1990s have resulted in a more even distribution of revenues across species in recent years. During 1999, the largest contributors to landings were whiting (74%), flatfishes (9%) and *sebastes* (7%), while the major contributors to revenue were sablefish (28%), whiting (22%), *sebastes* (21%), flatfishes (21%), and thornyheads (7%) (Tables II-2 and II-3, Figures II-16 and II-17).

<u>California:</u> In California, total groundfish landings declined during 1983-1999 by 76% from 50,400 mt to 12,100 mt, and groundfish revenues declined by 65% from $44.9 million to $15.9 million. The non-whiting component of groundfish landings declined by 78% from 49,400 mt to 10,800 mt, and non-whiting revenues fell by 65% from $44.6 million to $15.7 million. At the species level, some of the more significant features of the fishery are: (1) the 87% decline in *sebastes* landings from 18,400 mt to 2,400 mt and the 77% decline in *sebastes* revenues from $16.4 million to $3.7 million during 1983-1999; (2) the 59% decline in flatfish landings from 11,600 mt to 4,800 mt and the 77% decline in flatfish revenues from $17.5 million to $4.1 million during 1983-1999; (3) the exceptionally high sablefish prices during 1995-1999; and (4) the role of thornyheads as a significant (though not major) source of landings and revenues during the late-1980s through mid-1990s (Tables II-2 and II-3, Figures II-18 and II-19).

Sebastes and, to a lesser extent, flatfishes were generally the largest components of groundfish harvest and revenues from the 1980s through the mid-1990s. The decline in *sebastes* and flatfish landings and the increase in thornyhead and sablefish prices experienced in recent years have resulted in a more even distribution of revenues across species. During 1999, the largest contributors to landings were flatfishes (40%), *sebastes* (20%), sablefish (14%), thornyheads (11%) and whiting (7%), while the largest contributors to revenues were flatfishes (26%), *sebastes* (24%), sablefish (23%) and thornyheads (17%) (Tables II-2 and II-3, Figures II-20 and II-21).

II.A.2. Biological and Regulatory Factors Affecting Non-Whiting Landings

Whiting stock biomass, which declined from a peak of 5.7 million mt in 1987 to 2.3 million mt in 1994, appears to have stabilized at 1.7-1.8 million mt since the mid-1990s (Dorn *et al.* 1999). Given the relative stability of whiting harvests in recent years (Table II-1), this report focuses largely on non-whiting groundfish stocks and the effect of their decline on capital utilization in the fishery.

In 1981 the Council proposed a rebuilding program for Pacific ocean perch (POP), which had been depleted by foreign fishing during the 1960s and 1970s. The states of Washington and Oregon established vessel landings limits for POP, and a POP rebuilding program was subsequently incorporated into the Groundfish FMP when it was implemented in 1982 (PFMC

1982). Most other non-whiting groundfish stocks, however, were not subjected to significant exploitation until expansion of the domestic groundfish fishery in the 1980s. Non-whiting groundfish landings, which peaked during the late 1980s and early1990s, declined to unprecedented low levels in the 1990s. These declines are best understood in the context of recent scientific and statutory developments affecting groundfish management.

Each year the Pacific Council establishes an Acceptable Biological Catch (ABC) -- a biologically based estimate of the amount of fish that can be harvested without jeopardizing the resource -- for each species/species group. Based on these ABCs, the Council then recommends a numerical harvest objective for each species/species group for which individual management is warranted. The harvest objective -- also known as the optimum yield (OY) – takes the form of a quota or harvest guideline (HG). A quota is a point estimate the attainment of which precipitates automatic closure of the fishery; an HG can be expressed as an interval or point estimate, the attainment of which does not necessarily require automatic closure.

OY may be less than ABC as a precautionary response to uncertainty in stock abundance estimates or to account for unavoidable catch of incidental species that would otherwise be discarded. Until recently, OYs were allowed to exceed ABCs, for instance, in order to phase in harvest restrictions that were expected to have a significant economic impact on the fishery. However, since implementation of Amendment 11 to the Groundfish FMP in 1999 (which will be discussed more extensively later in this section), OY is now allowed to exceed ABC only under very exceptional circumstances and after an extensive review and approval process.

The Council uses different approaches to setting ABCs and OYs, depending on whether or not a groundfish stock has been assessed on the basis of a formal statistical model. For most assessed stocks, the Council sets ABCs by using spawning potential per recruit (SPR) as a proxy for maximum sustainable yield (MSY).[4] This approach involves applying a fixed fishing mortality rate (F_{spr}) to the exploitable stock -- F_{spr} being the exploitation rate that would reduce average egg production per female to some target proportion of its unfished level. For unassessed stocks, the Council bases ABCs on the level of landings experienced during some designated baseline period. In recent years, management of both assessed and unassessed stocks has changed significantly to yield more conservative OYs than previously used.

Denoting F_{msy} as the exploitation rate that provides MSY to the fishery, the Council's harvest rate policy for assessed stocks prior to 1998 was to use $F_{35\%}$ as a proxy for F_{msy} -- $F_{35\%}$ being the exploitation rate that would reduce average egg production per female to 35% of its unfished level. The choice of $F_{35\%}$ was based on theoretical work done by Clark (1991). In 1998, the Council changed the F_{msy} proxy for *sebastes* rockfish from $F_{35\%}$ to $F_{40\%}$ on the basis of additional analyses by Clark (Clark 1993) and others (Mace 1994; Ianelli and Heifetz 1995)

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[4] An exception to this is Pacific whiting, which is managed under a so-called "hybrid F" strategy. Conversion from the hybrid F to an F_{spr} strategy is currently being considered (Dorn 1999).

indicating that $F_{40\%}$ (a more conservative harvest regime than $F_{35\%}$) was warranted for stocks which exhibit stochastic and/or serially correlated recruitment or for which the stock-recruitment relationship is unknown.

In 1999, the Pacific Council implemented Amendment 11 to the Groundfish FMP (PFMC 1998). The purpose of Amendment 11 was to address new provisions of the 1996 Sustainable Fisheries Act (SFA) requiring that harvests in federally managed fisheries not exceed MSY, that specific thresholds be defined for designating a stock as "overfished" and that rebuilding plans be prepared for overfished stocks with the goal of achieving MSY within a specified time period. Amendment 11 defines 40% of unfished spawning biomass (i.e., $B_{40\%}$) as the MSY biomass and 25% of unfished spawning biomass (i.e., $B_{25\%}$) as the threshold for identifying overfished groundfish stocks. Stocks whose biomass falls within the $B_{25\%}$-$B_{40\%}$ range are said to be in the "precautionary zone", while stocks whose biomass is less than $B_{25\%}$ are said to be in the "overfished/rebuilding zone". Amendment 11 also established a new default harvest rate policy (known as the "40-10 policy") whereby OY takes a maximum value of ABC if $B > B_{40\%}$, declines disproportionately relative to ABC at progressively lower biomass levels between $B_{40\%}$ and $B_{10\%}$, and reaches zero at biomass levels equal to or less than $B_{10\%}$. Amendment 11 also specified a default value for F_{spr} ($F_{40\%}$ for *sebastes* rockfish, $F_{35\%}$ for other groundfish species) that could be superseded as new and better scientific information became available.

In 1999, the Council began applying the 40-10 harvest policy to all assessed groundfish stocks. Under this new policy, lingcod, bocaccio in California, POP, canary rockfish and cowcod were designated to be in the "overfished/rebuilding zone". Formal rebuilding plans were initiated in 2000 for lingcod, bocaccio and POP[5], with time to rebuilding for these species projected to be 10, 38 and 47 years respectively. Rebuilding plans will be required in 2001 for canary and cowcod. Another outcome of the 40-10 policy was the assignment of shortspine thornyhead and widow rockfish to the "precautionary zone". In 2000, the Council changed the F_{spr} from $F_{35\%}$ to $F_{40\%}$ for shortspine and from $F_{40\%}$ to $F_{45\%}$ for widow.

Amendment 11 has also lead to more conservative management of groundfish stocks that have not been assessed using formal modeling techniques. These include (1) stocks that have not been assessed by any method, and (2) stocks (all within the *sebastes* complex) that have been "lightly" assessed by a much less rigorous method that the formal modeling techniques customarily used. Beginning in 1999, the Council reduced the OYs for "lightly" assessed stocks to 75% of their ABCs, and reduced OYs for stocks which remained unassessed by any method at 50% of their ABCs. These precautionary adjustments were made to reflect the limited information regarding abundance of these stocks.

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[5] POP rebuilding measures have been implemented annually since the inception of the Groundfish FMP in 1982. However, while these rebuilding measures have discouraged targeting and prevented further decline in POP abundance, they appear to have done little to achieve recovery.

In 1999, the Council was presented with new scientific information suggesting that the productivity of West Coast groundfish is unusually low relative to other groundfish stocks worldwide. This information may have far-reaching management implications, for it suggests that the Council's harvest rate policy -- which has already become more conservative as a result of Amendment 11 -- is still not conservative enough to prevent excess harvest of some species. To more fully investigate and evaluate this evidence, the Council's Scientific and Statistical Committee will convene a Harvest Rate Policy Review Workshop in March 2000 to evaluate the appropriateness of the current default F_{spr} values being used by the Council as proxies for F_{msy}.

In 2000, the Council also took action to discourage targeting of overfished or depleted species by prohibiting trawl vessels that use large footropes from landing nearshore and shelf rockfish, lingcod and most flatfish. (Large footropes are used as a means of attaching large rollers to bottom trawl gear to facilitate their use in rocky areas, where shelf rockfish are commonly taken.) The Council also allocated the major share of the nearshore rockfish OYs to the recreational sector. These two actions significantly reduced fishing opportunities for commercial open access and limited entry vessels. For the first time, the Council separated the "minor" rockfish species into nearshore, shelf and offshore components -- based on the depths where the fish are predominantly caught -- and set separate landings limits for each component. This action was intended to better align harvest levels with the ABCs for the individual species.

The declines in abundance observed for many West Coast groundfish stocks have been inadvertently fostered by harvest policies that -- while based on the best scientific information available at the time -- are now thought to contribute to overfishing. New scientific information and the new requirements of the SFA are leading to more conservative harvest restrictions. Given the depressed status of many groundfish stocks, the long periods required to rebuild overfished stocks, the multispecies nature of the fishery, and the possibility of additional rounds of OY reductions once the results of the March 2000 Havest Rate Policy Review Workshop become available, allowable non-whiting harvests are likely to remain restricted for many years to come.

II.B. Groundfish FMP Amendment 6 - Limited Entry

As indicated in Section II.A.1, the whiting fishery in the EEZ was quickly transformed from a largely joint venture fishery in 1990 to a completely Americanized fishery in1991. The Council was quickly faced with the need to allocate the whiting resource between expanding shoreside and offshore sectors of the fishery, and to take additional measures (e.g., season closures, trip limits) to ensure that the whiting OY was not exceeded. By the early 1990s, many of the non-whiting OYs were also being fully utilized and harvest capacity was expanding in that segment of the fishery as well. However, concerns regarding whiting appear to have been the major impetus for the Council's 1992 approval of a limited entry program for the commercial groundfish fishery. This section describes the provisions of the program and changes in the limited entry fleet that have occurred since the program was implemented in 1994.

II.B.1. Limited Entry Provisions

Under Amendment 6 to the Groundfish FMP (PFMC 1992a), the Council established a limited entry program whereby vessels meeting minimum landings requirements (MLRs) for trawl, longline or fishpot gear during the window period July 1, 1984 - August 1, 1988 could qualify for a transferable limited entry permit.[6] Permit holders were allowed to use only those gears endorsed on their permits (i.e., those gears for which they met the MLRs) while participating in the limited entry fishery. While permits must be renewed annually, permit holders are not required to land any groundfish in order for the permit to remain valid. To discourage increases in harvest capacity associated with the transfer of permits from smaller to larger boats, non-permitted vessels desiring to enter the fishery are required to either purchase a permit from a similar-sized or larger vessel or to purchase a combination of permits from smaller vessels according to a conversion formula based on vessel length. Trip limits and trip frequency limits, which were already being used to restrict harvest rates on the major groundfish complexes, were also expected to reduce the incentive for vessels to engage in "capital stuffing".[7]

Amendment 6 also established an open access groundfish fishery in which non-permitted vessels using longline and fishpot gear and vessels using exempted gear (i.e., gear other than groundfish trawl, longline and fishpot) could participate. The open access fishery is allocated a specified percentage of the available harvest each year based on the combined catch history of non-permitted longline, fishpot and exempted vessels during the window period July 11, 1984-August 1, 1988. The open access fishery is regulated by season closures and vessel landings limits to ensure that its annual allocation is not exceeded.

Because U.S. catcher-processors did not enter the whiting fishery until 1990 and therefore had not made any West Coast groundfish landings during the 1984-1988 window period, none of them qualified as initial permit holders.[8] Thus all of the 629 permits initially issued went to

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[6] MLRs during the window period varied by gear type as follows: trawl - 9 landings of at least 500 pounds of non-whiting groundfish or 450 mt of non-whiting groundfish or 17 landings of at least 500 pounds of whiting or 3,750 mt of whiting; longline - 6 landings of at least 500 pounds of groundfish or 37.5 mt of groundfish; fishpot - 5 landings of at least 500 pounds of groundfish or 150 mt of groundfish (PFMC 1992a, pp. 2-3).

[7] "Capital stuffing" pertains to the technological innovations and fishing practices that allow fishermen to increase their share of the allowable harvest in the race for fish. As these innovations and practices become more widespread, the competitive advantage they initially provided tends to dissipate, leading to additional rounds of innovation and higher costs for the fleet as a whole without a commensurate increase in harvest.

[8] Because limited entry permits are licenses to harvest, motherships can participate in the groundfish fishery without a permit.

catcher boats, of which 384 were endorsed for trawl gear and 245 were endorsed for fixed gear. The number of permits initially issued closely paralleled the number of boats that participated annually in the groundfish fishery during the late 1980s. For instance, in 1987, 344 trawlers made at least one groundfish landing and 30 fishpot boats and 218 longliners made at least three groundfish landings (PFMC 1992b, p. 4-5). Thus limited entry, as implemented in 1994, excluded catcher-processors while including catcher boats with virtually any history in groundfish fishery.

II.B.2. Changes in Limited Entry Fleet 1994-1999

While catcher-processors did not qualify as initial permit recipients, they could still enter the whiting fishery by purchasing combinations of permits from willing sellers. Nine catcher-processors entered the limited entry fishery in 1994 and a tenth entered in 1995. The decline in the number of trawl endorsements from 384 to 289 during 1994 is largely due to the transfer of permits from trawlers to catcher-processors. While permit transfers of other types have also occurred and some permits have lapsed over the years, the transfers from trawlers to catcher-processors comprise the most significant change in groundfish fleet configuration since the inception of limited entry (Table II-4).

Potential harvest capacity includes both unutilized (i.e., latent) and utilized capacity. Although limited entry has likely had the effect of "freezing" potential harvest capacity in the fishery at its 1994 level, the low MLRs used to qualify for a permit virtually assured that a significant proportion of the potential harvest capacity initially admitted into the fishery consisted of latent capacity. Furthermore, the amount of time elapsed between the window period (i.e., the 1984-1988 period during which vessels would had to fish to qualify for a limited entry permit) and the year when limited entry was actually implemented (1994) increased the likelihood of permits being issued to vessels whose involvement in the groundfish fishery had waned by the time permits were actually issued.

Permit transferability per se has the advantage of flexibility, in that it allows the composition of the fishing fleet to adapt to changes in environmental, biological and economic conditions, and allows individual vessels to enter and exit in response to changes in their personal circumstances. However, since vessels are typically not interested in buying a permit unless they intend to use it and since marginally involved fishery participants (i.e., vessels comprising the latent capacity in the fishery) are typically the most willing to sell their permits, the presence of significant latent capacity almost inevitably assures an increase in realized fishing effort when permits are transferred. The establishment of an active whiting catcher-processor sector resulting from the transfer of permits from trawlers to catcher-processors reduced the amount of latent capacity in the trawl sector and did little to curtail the actual amount of fishing effort expended by trawlers. Transfers involving fixed gear vessels have likely resulted in increased fishing effort in that sector of the fishery as well.

Beginning in 1997, fixed gear vessels were required to have their permits endorsed for sablefish in order to participate in the regular or mop-up sablefish seasons. Sablefish endorsements were received by 129 of the 204 longline permit holders and all 28 of the trap/pot permit holders that year. By 1999, the number of sablefish endorsements had increased to 32 for pot/trap and 133 for longline gear (Table II-4).

II.B.3. Distribution of Limited Entry and Open Access Fleets Across States

Table II-5 characterizes the current distribution of groundfish limited entry permits across states according to (1) the state in which the plurality of the permit holder's groundfish revenues occurred in the most recent year (1995-1998) of groundfish participation, and (2) the mailing address of the permit holder. The column labeled "Other States" pertains to permit holders residing outside of the three Pacific coast states. The column labeled "No Landings" pertains to permit holders who did not make shoreside groundfish landings in any of the Pacific coast states during 1995-1998. These "no landings" permit holders include catcher-processors in Washington, as well as catcher boats that delivered exclusively to motherships and vessels that held permits but did not participate at all in the groundfish fishery during 1995-1998. The 274 trawl, 204 longline and 32 pot permits described in the table do not correspond exactly to the number of limited entry vessels, since a small number of vessels hold more than one permit and a small number of permits are endorsed with more than one gear type.

Using plurality of revenue as the basis for assigning permits to states, the number of catcher boats with trawl endorsements is much larger in California (115) and Oregon (113) than in Washington (26). Ten of the 20 trawl endorsements in the "No Landings" category are held by whiting catcher-processors. The number of fixed gear endorsements is higher in California (94) than Oregon (71) or Washington (65). Similar trends are observed when mailing address is used as the basis for assigning permits to states (Table II-5).

Table II-5 also describes the distribution of permits with sablefish endorsements across states, according to the plurality of groundfish revenue and the mailing address of the permit holder. On the plurality of revenue basis, the number of fixed gear permits with sablefish endorsements is much lower in California (40) than Oregon (65) or Washington (62). The percentage of fixed gear permits with sablefish endorsements is also much lower in California (43%) than Oregon (91%) or Washington (94%). Similar trends are observed when mailing address is used for assigning permits to states.

Table II-6 describes the distribution of groundfish open access vessels across states. For purposes of the table, a groundfish landing was designated as "open access" if the ID of the vessel making the landing did not appear in the groundfish limited entry permit file on the date of that landing. For purposes of the table, each vessel was assigned to the same state across all years, based on the state accounting for the plurality of the vessel's total open access revenue in the most recent year fished (1995-1998). A vessel that made at least one open access bycatch landing during a year was considered to have participated in the open access bycatch fishery in that year -- a “bycatch” landing being one in which trawl or shrimp trawl gear was utilized or (regardless of gear type) the value of the non-groundfish portion exceeded the value of the groundfish portion of the landing. A vessel that made at least one open access directed landing during a year was considered to have participated in the open access directed fishery in that year --- a “directed” landing being one in which fixed gear was utilized and the value of the groundfish portion exceeded the value of the non-groundfish portion lf the landing. Of the 2,723 vessels that participated in the directed fishery and the 2,024 vessels that participated in the bycatch fishery during 1995-1998, 1,231 vessels participated in both.

Both the directed and bycatch components of the open access fishery are much larger in California than Oregon and Washington combined. For instance, in 1998, 779 California boats, 232 Oregon boats and 50 Washington boats participated in the directed fishery. In that same year, 520 California boats, 305 Oregon boats and 40 Washington boats participated in the bycatch fishery (Table II-6).

II.C. Capacity Utilization Rates in the Commercial Fishery

Measuring overcapacity involves comparing potential harvest capacity with the amount of fish actually available for harvest. While potential capacity may not have changed significantly since the inception of the 1994 limited entry program, capital utilization rates have declined in recent years as a result of precipitous declines in available harvest. To estimate the extent of current capital utilization, potential harvest capacity by limited entry fixed gear vessels (sablefish and non-sablefish components), limited entry trawlers (excluding catcher-processors[9]) and open access vessels that target groundfish were compared with the harvests available to each of those sectors in 2000.

For each sector, capital utilization was measured according to the following general procedure: The vessels belonging to each sector were sorted within each year 1984-1992 in descending order of their groundfish landings, and their cumulative landings were summed in the same order. Counting down from more to less productive vessels, a determination was made of the number of vessels it would have taken in each of those years to fully utilize the groundfish harvest available to each sector in 2000. Within each sector, comparisons were then made across years in order to determine the minimum number of vessels needed to harvest the 2000 OYs. The capital utilization rate (i.e., the proportion of current sector participants needed to harvest the 2000 OYs for that sector) was then estimated by dividing the minimum number of vessels derived from this interannual comparison by the total number of vessels that currently belong to

[9] Since 1998, catcher-processor companies belonging to the newly formed Pacific Whiting Conservation Cooperative have operated under a voluntary agreement whereby each company receives a specific share of the catcher-processor allocation. Benefits of the agreement include improvements in processing efficiency and reductions in waste and bycatch relative to the former derby fishery. The very existence of this agreement suggests that catcher-processors recognize and are attempting to deal with overcapitalization in their own sector.

that sector. The reason for using 1984-1992 as the baseline period for this comparison is that groundfish harvests were much less restricted in those earlier years than they are now.

II.C.1. Limited Entry Fixed Gear

In 1997 the Council began requiring fixed gear permit holders who participate in the regular or mop-up sablefish season to obtain a sablefish endorsement. Because the number of limited entry fixed gear vessels eligible to participate in the sablefish and non-sablefish fisheries now differs, capital utilization rates were estimated separately for sablefish and non-sablefish groundfish, as follows.

> Sablefish: Based on the 1984-1991[10] sablefish landings history of vessels who obtained a limited entry fixed gear permit when the program was initiated in 1994, the number of fixed gear highliners needed to harvest the 2000 fixed gear sablefish OY of 2,430 mt ranged from 9 to 25 during 1984-1990 and increased to 51 in 1991. Taking the 1984-1990 average of 15 vessels and dividing by the number of fixed gear sablefish endorsements in 1999 (161, according to Table II-4) yields a capital utilization rate for fixed gear sablefish of 9% (Table II-7).
>
> Non-Sablefish Groundfish: While the limited entry fixed gear fleet receives a sablefish allocation each year, it does not receive an allocation for other species. Thus the "target" fixed gear harvest of non-sablefish groundfish was estimated by taking the annual average percentage of groundfish landings (other than whiting, flatfish and sablefish) made by fixed gear permit holders during 1996-1998, and applying that percentage to the 2000 OYs for the same species. Based on the 1986-1992[11] non-sablefish groundfish landings history of vessels who obtained a limited entry fixed gear permit when the program was initiated in 1994, the number of fixed gear highliners needed to harvest the estimated 2000 non-sablefish "target" of 985 mt ranged from 41 to 61 during 1986-1988 and from 21 to 25 during 1989-1992. Taking 25 vessels as a reasonable estimate of the minimum number of fixed gear vessels needed to harvest the non-sablefish groundfish OYs and dividing by the 205 vessels with longline endorsements[12] in 1999 (calculated as the difference between the 227 fixed gear endorsements and 32 pot endorsements described in Table II-4) yields a capital utilization rate of 12% (Table II-7).

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[10] The 1992 landings history could not be used, since fixed gear permit holders landed less than the 2000 sablefish OY in 1992.

[11] The 1984-1985 landings history could not be used, since fixed gear permit holders landed less than the 2000 non-sablefish groundfish "target" OY in 1984 and 1985.

[12] Pot boats were excluded from this calculation, since they target sablefish only.

II.C.2. Limited Entry Trawl

Determining the capital utilization rate for the limited entry trawl sector (excluding catcher-processors) requires consideration of the minimum number of trawlers needed to fully utilize the non-whiting groundfish OYs, the whiting shoreside allocation and the whiting mothership allocation in 2000, and also (to prevent double counting) the extent to which these boats participate in more than one of these groundfish activities. This section focuses only on the non-whiting groundfish and shoreside whiting fisheries, since the data needed to evaluate catcher boat participation in the whiting mothership fishery could not be obtained and evaluated in time for this paper.

> Shoreside Whiting: Given that the whiting fishery was not Americanized until 1991, it did not make sense to use the years 1984-1992 as the basis for determining the number of limited entry trawlers needed to fully utilize the 2000 shoreside whiting OY. A different rationale was therefore used, as follows. Since 1992, the Council has delayed the opening of the whiting season for all fishery sectors – shoreside, motherships and catcher-processors -- in order to preclude fishing during periods when salmon bycatch is most likely to occur (Table II-8). Given the constraints on the length of the shoreside whiting season required for bycatch avoidance and the size of the shoreside allocation, the 37 trawlers who currently deliver to shoreside processors tend to be fully occupied during the whiting season. Thus 37 vessels was considered to be a reasonable estimate of the number of trawl endorsements needed to harvest the whiting shoreside allocation in 2000.
>
> Non-Whiting Groundfish: Although limited entry trawlers are allocated a specific portion of the sablefish OY each year, no similar allocation occurs for other non-whiting groundfish stocks. Therefore the "target" trawl non-whiting groundfish harvest in 2000 was estimated as the sum of the 2000 trawl sablefish allocation, the 2000 Dover sole OY, the 1998 landings of flatfish other than Dover, and the portion of the 2000 groundfish OYs for species other than sablefish, flatfish and whiting that were not assigned to the limited entry fixed gear in Section II.C.1 above. Based on the 1984-1992 non-whiting landings history of trawlers who obtained a limited entry permit when the program was initiated in 1994, the number of trawlers needed to harvest the 2000 non-whiting "target" of 37,612 mt was estimated to range from 60 to 86. Taking an intermediate point of this range, 70 vessels was considered to be a reasonable estimate of the minimum number of trawl endorsements needed to harvest the non-whiting groundfish available to this sector in 2000 (Table II-7).

Assuming that the 70 trawlers needed to fully utilize the non-whiting groundfish OYs include (as a subset) all of the 37 trawlers needed to fully utilize the shoreside whiting allocation, the capital utilization rate for the limited entry trawl sector would be 70 boats divided by the number of trawl permits currently held by catcher boats (264, according to Table II-5), or 27%. Assuming that the 37 shoreside whiting trawlers are a completely different group of boats than the 70 non-whiting groundfish trawlers, the capital utilization rate would be 37+70=107 boats divided by the number of current trawl permit holders, or 41%.[13]

II.C.3. Open Access

One approach to identifying the number of open access producers needed to harvest the 2000 open access OYs would be to evaluate the 1984-1992 performance of all vessels who landed groundfish during 1984-1992 but did not receive limited entry permits when the program was initiated in 1994. This definition of open access vessels, however, had to be modified for the following reasons:

a. Some vessels that made significant groundfish landings and met the MLRs during the 1984-1988 window period had lost interest in groundfish by the time the limited entry program was implemented and did not apply for a permit. The landings of these vessels during the earlier years of 1984-1992 more closely resemble that of subsequent limited entry than open access vessels. Other vessels that did not meet the MLRs during the 1984-1988 window period became more active in the groundfish fishery after the window period and obtained a LE permit after the program was implemented. The landings of these vessels during the later years of 1984-1992 more closely resemble that of limited entry than open access vessels. Treating either of these groups of vessels as "open access" during 1984-1992 could result in under-estimation of the number of highliners needed to harvest the 2000 open access OYs.

b. Groundfish participation by set net vessels was much higher during 1984-1992 than is possible in the current open access fleet.

In order to mitigate some of the downward bias in the capital utilization rate that would likely occur if vessels in categories (a) and (b) were defined as open access, groundfish trawlers and set net boats were excluded from consideration in determining the number of open access highliners needed to harvest the 2000 open access OYs. These exclusions do not address problems of bias associated with fixed gear vessels in category (a), several of whom made particularly large landings during 1984-1985. These latter vessels were instead dealt with by excluding 1984-1985 from consideration. For the remaining years 1986-1992, the number of

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[13] To the extent that the minimum number of catcher boats needed to fully utilize the 2000 whiting mothership allocation would be subsumed in the 70-107 boats needed to take the current shoreside whiting and non-whiting groundfish OYs, the capital utilization rate would remain at 27%-41%. To the extent that the minimum number of catcher boats needed to utilize the mothership allocation represents an addition to the 70-107 boats, the capital utilization rate would be somewhat higher.

open access vessels needed to harvest the open access groundfish allocation of 2,207 mt ranged from 47 to 105 boats (Table II-7). Based on these results, 50 and 100 were used as lower and upper estimates of the number of open access boats needed to harvest the 2000 open access groundfish allocation.

Participants in the open access fishery include vessels that land groundfish incidentally in the course of their participation in other fisheries, as well as vessels that target groundfish. In order to ensure that the capital utilization rate estimated for the open access fishery pertained only to vessels that target, the targeting sector was defined to include the 794 boats whose average annual open access groundfish landings during 1996-1998 was at least 0.25 mt.[14] Dividing the lower and upper limits of the number of vessels needed to harvest the 2000 open access allocation by 794 yields an open access capital utilization rate of 6%-13% (Table II-7).

II.C.4. Interpretation of Capital Utilization Rates

Current capital utilization rates are estimated at 9% and 12% respectively for the sablefish and non-sablefish components of the limited entry fixed gear fishery, 27%-41% for limited entry trawl and 6%-13% for open access. One reason why capital utilization rates are higher for limited entry trawlers than for limited entry fixed gear vessels is that a significant number of trawl permits were transferred to catcher-processors shortly after the limited entry program was implemented in 1994. If the number of trawl endorsements had remained at the number initially issued (384), the capital utilization rate for that sector would instead be 18%-28%.

In interpreting the capitalization utilization rates, the following assumptions should be noted:

a. One major assumption is that the vessels in each sector of the groundfish fishery could, if given the opportunity, replicate the harvests produced during 1984-1992 by highliners in their own sector. Two opposing factors may have some bearing on this assumption: (1) Because stock abundances are so much lower now than they were during 1984-1992, the minimum number of vessels now needed to harvest the 2000 OYs may be <u>greater</u> than indicated by the 1984-1992 data. (2) Because catch-per-unit-effort may have increased over time as a result of improvements in technology and the expertise of fishery participants, the minimum number of vessels now needed to harvest the 2000 OYs may be <u>fewer</u> than indicated by the 1984-1992 data. To the extent that the first factor outweighs the second, the capital utilization rates provided here will understate the number of boats needed to harvest the 2000 OYs; to the extent that the second factor outweighs the first, the reverse will be true.

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[14] Source: Jim Hastie (NMFS, Northwest Fisheries Science Center, Seattle, WA)

b. The estimated minimum number of vessels needed to harvest the 2000 OYs is affected by the extent to which 1984-1992 groundfish fishery participants also participated in non-groundfish fisheries in those same years. The estimated capital utilization rates will therefore understate/overstate the true rates to the extent that opportunities in other fisheries would divert groundfish participants to a greater/lesser extent than they did during 1984-1992.

c. The capital utilization rates are based on the assumption that the 2000 harvest levels will be available to each sector indefinitely into the future. To the extent that future harvests are less/more than the 2000 levels, the utilization measures provided here will understate/overstate the true extent of overcapitalization in the fishery. The outcome of the March 2000 Harvest Rate Policy Review Workshop will likely have a significant bearing on this issue.

d. A number of assumptions made with regard to specific fishery sectors should also be noted: (1) The "target" trawl non-whiting groundfish harvest for 2000 may be less than the amount specified in Table II-7 if, for instance, thornyhead harvest restrictions prevent the fleet from fully utilizing the 2000 Dover OY. To the extent that this is true, the capital utilization rates for trawlers may be lower than those estimated in Table II-7. (2) The number of open access vessels targeting groundfish can be estimated in any number of different ways, only one of which was used in Table II-7.

The capital utilization rates provide very approximate estimates of the number of boats needed to achieve economic efficiency. The Council's target fleet size may be based on a less stringent standard than efficiency (e.g., economic viability). However, despite the uncertainty in the estimates provided here, it is apparent that even if the groundfish fishery could provide a viable livelihood to twice as many vessels at indicated in Table II-7, capital utilization would still be extremely low and still provide a compelling argument for capital reduction.

II.D. Effects of Overcapacity

II.D.1. Regulatory Effects

Vessel landings limits are an integral element of groundfish management and are used to achieve a variety of objectives. For instance, landings limits may be used to extend the season by delaying achievement of an OY, discourage targeting while allowing for a limited amount of incidental take, or restrict the overall catch of a multispecies complex in order to protect an individual component of the catch. The size of vessel landings limits and the duration of directed fishing seasons are useful indicators of the extent to which access to an OY must be "rationed" because of overcapacity in the fishery.

II.D.1.a. Changes in Vessel Landings Limits

When the Groundfish FMP was originally implemented in 1982, the Council imposed individual trip limits on two components of the *sebastes* complex that were in need of rebuilding (POP and widow rockfish), as well as a separate *sebastes* complex limit covering all other *sebastes* stocks. In 1984 the Council separated the *sebastes* complex into north and south components for purposes of trip limit management. Over the years, as more information became available regarding the abundance of individual groundfish stocks, additional stocks were placed under their own individual limits. In the north, individual limits were initiated for yellowtail in 1985 and canary in 1995 (Table II-9). In the south, individual limits were initiated for bocaccio in 1991, canary in 1995, chilipepper and splitnose in 1999 and cowcod in 2000 (Table II-10).

Trip limits were imposed on sublegal sablefish beginning in 1983 and on legal-sized sablefish beginning in 1988. In 1991, concerns regarding the status of shortspine thornyheads as well as sablefish prompted the Council to impose landings limits on the Dover sole, thornyhead and sablefish (DTS) complex as a whole and also restrict the amount of thornyheads that could be caught within that complex. In 1995 the Council restricted the amount of shortspines that could be caught within the thornyhead landings limit and in 1998 replaced the thornyhead limit with individual limits on shortspines and longspines. Dover sole was also placed under landings limits beginning in 1997 (Table II-11).

After years of refining landings limits to the individual species level, the Council completely did away with landings limits at the species complex level for DTS in 1998 and for *sebastes* in 2000. The DTS fishery is now managed with individual landings limits for sablefish, shortspine thornyheads, longspine thornyheads and Dover sole (Table II-11). The *sebastes* fishery is managed by individual limits for POP, widow, yellowtail and canary rockfish in the north, and for POP, widow, bocaccio, canary, chilipepper, splitnose and cowcod rockfish in the south. In both the north and south, all rockfishes not subject to individual species limits are categorized as minor slope, minor shelf or minor nearshore rockfishes, with each of these three categories subject to its own separate landings limit (Tables II-9 and II-10).

As OYs of many groundfish stocks have declined, the reductions in trip limits needed to ensure that the OYs are not exceeded has increased the potential for management-induced discards. To help decrease discards and reduce the frequency of inadvertent violations of the limits, the Council replaced trip limits with cumulative vessel landings limits. By 1991 weekly cumulative vessel limits rather than trip limits were the preferred form of landings limits for a number of groundfish stocks. The length of the cumulative limit period increased to two weeks in 1992-1993, one month in 1994-1995 and two months in 1996-1998. In 1999 the Council divided the season into three periods with varying cumulative limits as follows: one 3-month limit during January-March, three separate 2-month limits during April-September and three separate 1-month limits during October-December. In 2000, the Council modified the season as follows: two separate 2-month limits during January-April, three separate 2-month limits during May-October, and two separate 1-month limits during November-December.

In addition to the proliferation of individual species subject to vessel landings limits and increases in the duration of the cumulative limit period, there have also been significant reductions in the limits themselves. Tables II-9 through II-11 illustrate the variety of landings limits used by the Council since 1983, including trip limits without trip frequency limits (denoted *), trip limits combined with a frequency limit of one trip per week (denoted **) and cumulative vessel landings limits of varying duration. To facilitate comparison of landings limits over time, all of the limits imposed by the Council (except for the trip limits without trip frequency limits) appear in the tables as monthly-equivalent limits. (E.g., trip limits with frequency of one trip per week and 1-week limits were multiplied by 4, 2-week limits were multiplied by 2, 2-month limits were divided by 2, etc.) Thus, while the trip limits without frequency limits and the monthly-equivalent limits -- as depicted in the tables -- are not comparable with each other, each can be compared with their "own kind" over time.

All of the data in the tables pertain to preseason limits. While some of these limits may have been subject to in-season adjustment, in-season changes are not documented in the tables, since the purpose of the tables is to describe broad trends over time. In cases where the Council established different limits for a species/species complex by season or subarea within a given year, the limit reported in the tables for that species and year represents a weighted average. Additionally, the 1999-2000 limits reported in the tables for *sebastes* north and south and the DTS complex reflect adjustments that were made to ensure that the species composition of each complex was consistent with earlier years of the time series.[15]

Some of the major results from Tables II-9 through II-11 can be summarized as follows.

Sebastes north: The monthly-equivalent landings limit for the *sebastes* north complex, which was fairly stable (100,000-120,000 pounds) during 1984-1993, has been 10,000-20,000 pounds since 1997 (Figure II-22). Landings limits have also declined for individual *sebastes* species (i.e., POP, widow, yellowtail and canary rockfish) (Table II-9).

Sebastes south: For the *sebastes* complex south, trip limits were not replaced by cumulative vessel landings limits until 1992. Monthly-equivalent landings limits declined from 75,000-100,000 pounds during 1992-1998 to about 25,000 pounds during 1999-2000 (Figure II-22). Landings limits for individual *sebastes* species (e.g., POP, widow, bocaccio, canary) have declined as well (Table II-10).

Lingcod: Cumulative vessel landings limits and a 22" minimum size limit were first established for lingcod in 1995. The limits declined dramatically from a monthly-equivalent value of 20,000 pounds during 1995-1997 to 400-500 pounds during 1998-2000 (Table II-11). In addition to these landings limits, lingcod

[15] For additional details, see footnotes to Tables II-9 through II-11.

retention is being prohibited altogether during January-April and November-December of 2000.

<u>DTS:</u> The monthly-equivalent DTS limit fell from 110,000 pounds during 1991-1992 to about 25,000 pounds during 1999-2000 (Figure II-22). The shortspine limit, which was 4,000 pounds when it was first implemented in 1995, declined to 1,000 pounds by 1999 (Table II-11).

When the Council implemented the groundfish limited entry program, landings limits were imposed on open access as well as limited entry vessels. Open access limits have also declined in recent years, as follows.[16]

<u>Groundfish taken with open access gear:</u> For vessels participating in the open access fishery with longline or fishpot gear, monthly-equivalent limits for *sebastes* north and south were stable (35,000-40,000 pounds) during 1994-1998. The limit fell precipitously in 1999 to 5,700 pounds in the north and 10,200 pounds in the south. The limit declined even further in 2000 to 4,100 pounds in the north and 6,275 pounds in the south (Table II-12).

<u>Groundfish take with exempted trawl gear:</u> During 1994-1996, separate groundfish trip limits were imposed on trawlers targeting shrimp (1,500 pounds/trip), spot/ridgeback prawns (1,000 pounds/trip) and California halibut or sea cucumber (500 pounds/trip). Beginning in 1997, all non-groundfish trawlers have been subject to the same reduced groundfish trip limits -- 500 pounds in 1997-1998, and 300 pounds in 1999 (Table II-12).

II.D.1.b. Shortening of Sablefish Season

The widening divergence between potential harvest capacity and allowable harvests is evidenced not only by declining vessel landings limits for a wide range of groundfish stocks but also the shortened duration of the fixed gear sablefish season. The length of the sablefish derby declined from 365 days in 1983 to 175 days in 1990. Beginning in 1991, the Pacific Council set the West Coast sablefish season north of 36ºN latitude to coincide with the Alaska sablefish season in order to discourage diversion of fishing effort by Alaska longliners to the West Coast. Despite this action, the duration of the sablefish season declined to less than three weeks during 1992-1994 (Table II-13, Figure II-23).

In 1995, the North Pacific Fishery Management Council implemented an IFQ system for Alaska sablefish and halibut, thereby providing IFQ holders the opportunity to participate in the

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[16] The 1999-2000 open access limits for *sebastes* north and south reported here reflect adjustments that were made to ensure that the species composition was consistent with earlier years of the time series. See footnotes to Table II-12 for details.

West Coast sablefish fishery as well as the Alaska IFQ fisheries. Faced with the possibility of additional entry into an already overcapitalized fishery, the Pacific Council established a new season structure for sablefish in 1995 in order to better monitor and regulate the sablefish harvest rate. Under this structure, the "regular" season for limited entry vessels would be a derby fishery during which 70% of the allowable limited entry fixed gear sablefish harvest would be taken. Due to the expected shortness of the regular season, closing as well as opening dates would be announced in advance. The "mop-up" season would open several weeks later, during which time fixed gear permit holders would operate under equal cumulative limits until the remainder of the OY was taken. A daily trip limit fishery would be in effect outside the regular and mop-up seasons to discourage targeting but allow some incidental harvest of sablefish.

In 1997, in an attempt to further decelerate the sablefish harvest rate, the Council began requiring limited entry fixed gear vessels who wished to participate in the regular or mop-up season to obtain a sablefish endorsement. Separate cumulative limits were established for the regular and mop-up seasons. In 1999, vessels with sablefish endorsements were divided into three tiers based on their cumulative catch history, with vessels in different tiers subject to different cumulative limits during the regular season. While these management changes have stabilized the regular sablefish season for limited entry vessels at 6-9 days (Table II-13) rather than the 2-3 days the season would have become under a derby fishery, the season remains very short and has become very complex to administer.

In recent years, the Council has also taken additional action to decelerate the harvest rate in the daily trip limit sablefish fishery north of 36ºN latitude. A monthly cumulative limit was added to the trip limit in 1997. The monthly limit was subsequently replaced by a two-month cumulative limit in 1998.

II.D.2. Effects on Ability to Manage the Resource

The combination of low OYs and overcapitalization is jeopardizing the Council's ability to meet many of the management objectives specified in Amendment 4 of the Groundfish FMP (PFMC 1990), including the following:

> Objective 1 - Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.
>
> Objective 2 - Adopt harvest specifications and management measures consistent with resource stewardship responsibilities, for each groundfish species or species group.
>
> Objective 4 - Attempt to achieve the greatest possible net economic benefit to the nation for the managed fisheries.

Objective 5 - Identify those sectors of the groundfish fishery for which it is beneficial to promote year round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.

Objective 9 - Strive to reduce the economic incentives and regulatory measures that lead to wastage of fish.

Objective 11 - When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.

Overcapitalization in the groundfish fishery is significantly affecting the manner in which the fishery is managed and the effectiveness of management. In order to discourage management-induced discards, trip limits have been replaced by cumulative vessel landings limits which have increased in duration over time. As OYs have declined, so have the vessel landings limits. As a result, discards remain a significant concern (undermining Objectives 2 and 9). The fixed gear sablefish season has been reduced from months to days, and increasingly elaborate measures have been adopted to prevent the sablefish OY from being exceeded. Small landings limits and short seasons are exacerbating the economic inefficiencies resulting from too many boats chasing too few fish (undermining Objectives 4 and 5).

In order to better protect depressed stocks while continuing to allow harvest of healthy stocks, the number of species subject to individual monitoring and enforcement has increased. This trend has been accompanied by an increase in the amount of sorting that fishermen must do at sea in order to comply with regulations, and in the amount and specificity of the port sampling needed to ensure that individual species OYs are not exceeded (undermining Objective 1). The economic hardship and uncertainty being experienced by the industry is intensifying competition among fishery sectors for access to the resource. Protecting groundfish stocks while ensuring that the burden of conservation measures is distributed equitably among sectors of the fishery is becoming increasingly difficult (undermining Objective 11).

II.E. Conclusions Regarding Need for Capacity Reduction

The 1994 limited entry program was not sufficiently restrictive to address the overcapitalization that existed at the time of the program's inception. Moreover, the gap between harvest capacity and groundfish OYs that existed in 1994 has widened as stocks continue their downward decline, new scientific information has become available clarifying the extent and gravity of this decline, and OYs have been reduced to unprecedented low levels.

Low OYs are likely to continue well into the future. A number of groundfish stocks are already designated as belonging in the "overfished/rebuilding" and "precautionary" zones, and the length of time needed to rebuild overfished stocks is expected to extend several decades into the future. Regulatory restrictions on depressed stocks also impact the allowable harvest of more abundant stocks taken in mixed catches with depressed stocks. Even more conservative management measures may be forthcoming, depending on the outcome of the March 2000 Harvest Rate Policy Review Workshop.

The current capital utilization rate -- the percentage of current fishery participants needed to harvest the 2000 OYs -- is very low for all segments of the fishery (9% for limited entry fixed gear sablefish, 12% for limited entry fixed gear non-sablefish groundfish, 27%-41% for limited entry trawl catcher boats and 6%-13% for open access). In order to ensure that current fishery participants -- who are capable of expending much more fishing effort than needed to harvest the OYs -- do not exceed the OYs, the Council has reduced landings limits and shortened seasons to levels that are economically untenable and that increase the likelihood of discards. In an effort to simultaneously protect depressed stocks without unduly restricting opportunities to harvest healthier stocks, the Council is requiring much more sorting, monitoring and enforcement at the individual species level. The Council also spends considerable time dealing with the contentious issue of allocating the low OYs among fishery sectors. The consuming task of addressing groundfish issues imposes indirect costs as well, in terms of diverting the Council's attention away from important non-groundfish management issues.

Given that OYs are not likely to increase any time soon, existing management pressures will continue indefinitely unless capacity is significantly reduced. Capacity reduction should not be viewed as just another type of management measure. It is an essential element of a broader strategy to enhance the effectiveness of landings limits, seasons and other management measures in achieving conservation and economic objectives of the FMP. Capacity reduction should be considered for both limited entry and open access sectors of the fishery. (The extent of overcapitalization in the sport fishery should also be investigated and, if warranted, capacity reduction should be considered for that sector as well.) Without significant groundfish capacity reduction, the Council will continue to find it difficult, if not impossible, to achieve many of the conservation and economic objectives of the Groundfish FMP.

Some capacity reduction may occur even in the absence of deliberate action by the Council to the extent that vessels exit the fishery of their own accord. However, it is important to distinguish between actions leading to a permanent reduction in harvest capacity (vessels allowing their permits to lapse) versus actions leading to temporary or no reduction (vessels transferring their permits, or temporarily exiting from the groundfish fishery while retaining their permits). Permanent reduction is unlikely under the status quo. Limited entry vessels that stop fishing for groundfish will probably hold onto their permits in order to retain the groundfish option; the cost of permit renewal is minimal and the price that they would receive for selling their permit under current fishery conditions is likely to be low. Even those who are interested in permanently leaving the fishery may postpone their departure until it is known whether disaster relief will be forthcoming. Such departure (once it occurs) will more likely take the form of a permit sale than a lapsed permit, a low selling price being better than no remuneration at all. Of course, non-permitted vessels who participate in the open access fishery can enter and leave at will, so long as entry into the open access fishery remains unregulated.

In other words, latent capacity is always available in the open access fishery and likely to remain high in the limited entry fishery, since permit holders are much more likely to retain or transfer their permits rather than allow them to lapse. Unless the Council takes deliberate action, a significant amount of capacity will remain in the groundfish fishery that can be mobilized at any sign of improved fishing opportunities. Given that fishing effort can easily outpace OYs even if the OYs were to increase to much higher levels, the current problems associated with low landings limits and short seasons will not go away unless latent capacity is permanently removed from the groundfish fishery.

Table II-1. Pacific whiting harvest (metric tons), by fishery sector and year, and percent of whiting OY utilized each year, 1978-1998.[1]

Year	Foreign	Joint Venture	Shoreside	Mothership	Catcher-Processor	Tribal	Total	% OY
1978	96,827	856	689	0	0	0	98,372	76%
1979	114,910	8,834	937	0	0	0	124,681	63%
1980	44,023	27,537	793	0	0	0	72,353	41%
1981	70,366	43,557	838	0	0	0	114,761	66%
1982	7,089	67,465	1,024	0	0	0	75,578	43%
1983	0	72,100	1,051	0	0	0	73,151	42%
1984	14,772	78,889	2,721	0	0	0	96,382	55%
1985	49,853	31,692	3,894	0	0	0	85,439	49%
1986	69,861	81,639	3,463	0	0	0	154,963	52%
1987	49,656	105,997	4,795	0	0	0	160,448	82%
1988	18,041	135,781	6,876	0	0	0	160,698	69%
1989	0	203,578	7,418	0	0	0	210,996	94%
1990	0	170,972	8,115	0	4,713	0	183,800	94%
1991	0	0	20,600	79,803	117,102	0	217,505	95%
1992	0	0	56,127	36,172	116,277	0	208,575	100%
1993	0	0	42,108	14,515	84,588	0	141,211	99%
1994	0	0	73,656	91,926	87,147	0	252,729	97%
1995	0	0	73,949	40,588	61,571	0	176,107	99%
1996	0	0	85,731	44,146	68,359	14,999	213,235	100%
1997	0	0	87,499	50,401	70,771	24,840	233,511	100%
1998	0	0	87,862	50,087	70,365	24,509	232,588	100%

[1] Sources: 1978-1989 data - PFMC (1992b, p. 58); 1990-1993 data - PFMC (1995, pp. 30-35); 1994-1998 data - PFMC (1999a, pp. 15-21).
Estimates provided here include whiting discards by catcher-processors and motherships but do not include discards by catcher vessels delivering to motherships and shoreside processors. Numbers are preliminary and may differ from those provided in Table II-2 for shoreside landings.

Table II-2. Commercial shoreside groundfish landings (metric tons), by state and year, 1983-1999.[1]

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sebastes Rockfish:																	
WA	11,834	7,060	6,343	8,128	8,960	9,273	8,421	6,800	5,351	4,852	5,608	4,169	3,935	3,581	2,457	2,091	1,697
OR	15,254	12,227	11,980	11,095	13,910	14,105	15,847	12,445	12,462	13,069	14,858	11,862	10,002	10,602	8,441	7,148	6,067
CA	18,399	17,551	14,911	14,164	21,638	17,573	17,062	16,536	15,612	14,845	12,407	7,494	8,048	7,453	7,284	6,727	2,369
Total	45,487	36,838	33,234	33,387	44,508	40,951	41,330	35,781	33,425	32,766	32,873	23,525	21,985	21,636	18,182	15,966	10,133
Thornyheads:																	
WA	118	253	56	25	63	69	131	156	134	214	604	685	580	430	365	162	84
OR	835	795	1,117	673	727	1,043	2,553	4,529	3,506	4,281	4,460	4,043	3,336	2,786	2,326	1,460	1,058
CA	1,711	2,126	2,940	2,950	3,697	4,939	6,549	7,044	4,398	7,092	6,119	3,316	3,634	3,313	1,597	1,908	1,308
Total	2,664	3,174	4,113	3,648	4,487	6,051	9,233	11,729	8,038	11,587	11,183	8,044	7,550	6,529	4,288	3,530	2,450
Flatfish:																	
WA	5,529	6,284	6,025	4,177	5,115	4,704	6,190	7,045	5,706	3,668	3,119	3,060	2,388	3,641	2,648	2,773	4,143
OR	12,456	8,830	8,628	7,368	9,074	10,564	12,381	11,326	14,042	10,418	10,485	7,562	7,074	8,553	7,192	7,092	8,457
CA	11,648	12,586	15,786	14,583	14,679	11,774	11,326	9,328	10,767	10,719	8,490	6,923	8,755	9,328	8,375	5,561	4,826
Total	29,633	27,700	30,439	26,128	28,868	27,042	29,897	27,699	30,515	24,805	22,094	17,545	18,217	21,522	18,215	15,426	17,426
Sablefish:																	
WA	3,363	4,413	3,869	2,415	3,144	2,938	2,416	1,724	2,237	1,790	1,713	1,388	1,951	1,947	2,036	1,159	1,688
OR	4,641	4,835	5,275	4,653	5,238	4,082	3,948	3,705	3,906	3,856	3,835	4,005	3,133	3,175	2,925	1,750	2,967
CA	6,694	4,826	5,171	6,220	4,404	3,856	4,075	3,750	3,353	3,714	2,597	2,186	2,818	3,195	2,967	1,436	1,653
Total	14,698	14,074	14,315	13,288	12,786	10,876	10,439	9,179	9,496	9,360	8,145	7,579	7,902	8,317	7,928	4,345	6,308
Lingcod:																	
WA	1,524	2,043	2,130	714	1,023	757	1,137	993	892	561	676	477	278	360	290	38	41
OR	1,734	1,057	1,052	656	717	1,004	1,174	874	1,486	708	833	859	649	717	767	161	174
CA	898	951	695	524	812	867	1,257	1,064	788	613	685	568	539	479	480	149	131
Total	4,156	4,051	3,877	1,894	2,552	2,628	3,568	2,931	3,166	1,882	2,194	1,904	1,466	1,556	1,537	348	346
Other Non-Whiting:																	
WA	543	791	672	436	1,718	2,522	1,722	1,311	2,123	2,415	2,111	2,019	741	1,348	957	961	633
OR	173	127	86	66	681	1,070	841	333	706	622	901	647	616	7,942	4,055	1,663	278
CA	10,082	9,367	7,111	4,984	8,290	5,283	10,906	3,397	1,867	1,561	2,216	3,423	2,345	2,930	2,717	2,037	489
Total	10,798	10,285	7,869	5,486	10,689	8,875	13,469	5,041	4,686	4,598	5,228	6,089	3,702	12,220	7,729	4,661	1,400

Table II-2 (cont)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All Non-Whiting																	
WA	22,911	20,844	19,095	15,895	20,023	20,263	20,017	18,029	16,443	13,500	13,831	11,798	9,873	11,307	8,753	7,184	8,286
OR	35,093	27,871	28,138	24,511	30,347	31,868	36,744	33,212	36,108	32,954	35,372	28,978	24,810	33,775	25,706	19,274	19,001
CA	49,432	47,407	46,614	43,425	53,520	44,292	51,175	41,119	36,785	38,544	32,514	23,910	26,139	26,698	23,420	17,818	10,775
Total	107,436	96,122	93,847	83,831	103,890	96,423	107,936	92,360	89,336	84,998	81,717	64,686	60,822	71,780	57,879	44,276	38,062
Shoreside Whiting:																	
WA	6	47	14	61	95	88	27	302	504	2,237	3,188	4,884	4,037	10,905	7,241	10,513	9,099
OR	65	338	885	420	183	246	89	2,294	13,643	48,961	35,820	65,110	66,840	62,991	70,875	71,626	73,012
CA	980	2,335	2,996	2,982	4,518	6,533	7,298	5,519	6,893	4,930	3,100	3,613	4,091	2,901	6,332	5,723	1,308
Total	1,051	2,720	3,895	3,463	4,796	6,867	7,414	8,115	21,040	56,128	42,108	73,607	74,968	76,797	84,448	87,862	83,419
All Groundfish Species:																	
WA	22,917	20,891	19,109	15,956	20,118	20,351	20,044	18,331	16,947	15,737	17,019	16,682	13,910	22,212	15,994	17,697	17,385
OR	35,158	28,209	29,023	24,931	30,530	32,114	36,833	35,506	49,751	81,915	71,192	94,088	91,650	96,766	96,581	90,900	92,013
CA	50,412	49,742	49,610	46,407	58,038	50,825	58,473	46,638	43,678	43,474	35,614	27,523	30,230	29,599	29,752	23,541	12,083
Total	108,487	98,842	97,742	87,294	108,686	103,290	115,350	100,475	110,376	141,126	123,825	138,293	135,790	148,577	142,327	132,138	121,481

[1] Sources: 1983-1998 data obtained from PFMC (1999a; pp. T-13, T-15 and T-17). 1999 data obtained from PacFIN state reports as of January 26, 2000 and are preliminary.

Table II-3. Ex-vessel value of commercial shoreside groundfish landings ($1000s, base year=1999), by state and year, 1983-1999.[1]

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Sebastes Rockfish:																	
WA	8,225	5,025	5,187	7,171	8,939	7,758	6,340	5,040	4,173	3,833	4,167	3,445	3,403	2,809	1,951	1,755	1,498
OR	10,597	9,461	9,739	9,832	13,916	11,815	11,902	9,183	9,745	10,100	11,127	9,307	8,397	8,320	6,703	6,440	5,703
CA	16,365	16,419	15,658	16,384	25,029	19,144	18,216	17,445	16,538	16,274	13,782	9,487	10,231	9,155	8,742	7,933	3,714
Total	35,186	30,905	30,583	33,387	47,884	38,717	36,458	31,669	30,456	30,207	29,076	22,238	22,032	20,283	17,396	16,128	10,915
Thornyheads:																	
WA	89	175	45	23	61	67	123	140	149	217	624	1,078	1,289	813	600	229	138
OR	616	627	898	596	724	1,074	2,644	4,725	4,106	4,694	4,894	6,900	7,762	5,512	3,935	2,114	1,787
CA	1,372	1,739	2,375	2,576	3,650	5,119	6,852	7,317	5,233	8,733	7,636	6,062	8,847	6,830	2,952	3,344	2,716
Total	2,077	2,541	3,318	3,196	4,434	6,259	9,619	12,182	9,488	13,644	13,153	14,040	17,897	13,155	7,487	5,687	4,641
Flatfish:																	
WA	6,879	4,754	4,634	3,250	4,915	4,322	4,512	3,980	3,529	2,418	2,100	1,776	1,915	2,058	1,679	1,680	1,836
OR	18,914	8,575	8,098	7,593	10,182	11,058	11,040	9,012	11,812	7,733	7,554	5,554	6,001	6,316	5,609	5,509	5,881
CA	17,467	11,394	14,512	13,965	15,669	12,324	10,699	8,148	9,701	8,726	6,736	6,007	7,699	7,924	6,927	4,958	4,073
Total	43,260	24,724	27,244	24,808	30,766	27,704	26,251	21,140	25,041	18,877	16,390	13,337	15,615	16,298	14,215	12,148	11,790
Sablefish:																	
WA	3,035	3,668	6,177	3,848	6,258	6,150	4,253	3,213	6,542	4,376	3,412	3,321	7,508	7,425	8,754	3,336	5,012
OR	3,526	3,278	4,978	5,140	7,015	5,941	4,918	4,280	5,988	6,200	5,005	8,043	9,741	10,575	10,492	4,683	7,683
CA	5,492	3,336	4,214	6,620	5,265	4,561	4,630	4,345	4,358	5,063	2,768	3,661	7,759	9,097	9,319	3,407	3,578
Total	12,053	10,283	15,368	15,608	18,539	16,651	13,802	11,839	16,889	15,638	11,185	15,025	25,008	27,096	28,566	11,426	16,273
Lingcod:																	
WA	1,287	1,582	1,718	663	1,131	739	1,006	869	785	524	579	433	282	362	274	47	52
OR	1,489	882	882	631	827	1,063	1,114	800	1,276	660	748	824	652	722	808	255	290
CA	798	834	669	588	978	1,017	1,408	1,138	833	671	730	640	652	597	569	275	261
Total	3,575	3,298	3,269	1,882	2,936	2,819	3,527	2,807	2,895	1,855	2,056	1,897	1,585	1,681	1,651	577	603
Other Non-Whiting:																	
WA	425	468	377	303	1,620	1,847	1,148	793	1,311	1,492	1,088	1,006	493	468	622	510	360
OR	147	107	80	63	685	858	606	202	466	483	513	287	255	313	548	434	178
CA	3,134	2,485	2,285	1,553	2,033	1,351	2,273	744	488	494	700	986	1,143	2,672	1,951	1,905	1,399
Total	3,706	3,061	2,752	1,919	4,337	4,056	4,027	1,739	2,264	2,469	2,301	2,279	1,891	3,454	3,121	2,849	1,936

Table II-3 (cont.)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All Non-Whiting:																	
WA	19,941	15,673	18,138	15,258	22,923	20,883	17,381	14,035	16,488	12,860	11,970	11,060	14,889	13,934	13,881	7,557	8,896
OR	35,290	22,931	24,675	23,854	33,348	31,809	32,224	28,203	33,393	29,869	29,841	30,915	32,808	31,757	28,096	19,435	21,522
CA	44,627	36,208	39,722	41,687	52,624	43,515	44,079	39,138	37,151	39,961	32,352	26,842	36,330	36,275	30,459	21,824	15,741
Total	99,858	74,812	82,535	80,798	108,896	96,207	93,684	81,376	87,003	82,691	74,162	68,817	84,027	81,967	72,436	48,815	46,159
Shoreside whiting:																	
WA	0	9	3	11	25	25	6	56	94	240	235	276	388	755	733	609	748
OR	50	89	270	80	47	55	19	268	1,689	5,824	2,558	4,693	7,468	4,343	6,731	3,826	5,918
CA	254	515	578	547	844	1,434	1,345	961	1,040	685	383	386	486	250	599	401	116
Total	304	613	852	638	916	1,514	1,370	1,285	2,823	6,749	3,176	5,356	8,343	5,348	8,063	4,835	6,782
All Groundfish Species:																	
WA	19,941	15,682	18,141	15,269	22,948	20,908	17,388	14,091	16,583	13,100	12,204	11,336	15,278	14,689	14,614	8,165	9,644
OR	35,340	23,020	24,945	23,934	33,395	31,864	32,243	28,472	35,082	35,693	32,399	35,608	40,276	36,100	34,826	23,261	27,440
CA	44,881	36,723	40,301	42,233	53,468	44,949	45,424	40,098	38,191	40,646	32,735	27,228	36,817	36,525	31,059	22,225	15,857
Total	100,162	75,425	83,386	81,436	109,812	97,721	95,054	82,661	89,855	89,440	77,338	74,172	92,370	87,315	80,499	53,650	52,941

[1] Sources: 1983-1998 data obtained from PFMC (1999a; pp. T-14, T-16, T18). 1999 data obtained from PacFIN state reports as of January 26, 2000 and are preliminary. All values were corrected to 1999 dollars using the Implicit Price Deflator for Gross Domestic Product.

Table II-4. Number of limited entry endorsements on January 1 of each year, by gear type and year, 1994-1999.[1]

	Sablefish[3]			Non-Sablefish			Trawl	
Year	Pot/Trap	Longline	#Permits	Pot/Trap	Longline	Fixed Gear	Catcher Boat	Catcher Processor
Initial[2]	n.a.	n.a.	n.a.	n.a.	n.a.	245	384	0
1994	n.a.	n.a.	n.a.	n.a.	n.a.	245	280	9
1995	n.a.	n.a.	n.a.	n.a.	n.a.	252	277	10
1996	n.a.	n.a.	n.a.	n.a.	n.a.	247	276	10
1997	28	129	154	0	75	227	270	10
1998	33	138	167	0	67	227	265	10
1999	32	133	161	0	66	227	264	10

[1] Source: Kevin Ford (NMFS, Northwest Region, Seattle, WA).

[2] "Initial" refers to the number of permits issued at the inception of the program to vessels meeting the minimum landings requirements.

[3] Beginning in 1997, limited entry fixed gear permit holders were required to have a sablefish endorsement in order to participate in the regular or mop-up sablefish season. The number of fixed gear permits with sablefish endorsements during 1997-1999 is less than the sum of pot/trap and longline sablefish endorsements, since a small number of permits have multiple gear endorsements.

Table II-5. Current number of limited entry permits, by gear endorsement, state accounting for the plurality of groundfish revenue in the most recent year (1995-1998) of groundfish participation, and state of residence of permit holder. Numbers in parentheses denote permits with sablefish endorsement.[1]

	State Accounting for Plurality of Groundfish Revenue				
Gear Type	California	Oregon	Washington	No Landings[2]	Total
Trawl	115 (0)	113 (2)	26 (0)	20 (0)	274 (2[4])
Longline	88 (34)	48 (43)	63 (60)	5 (0)	204 (137)
Pot	6 (6)	23 (22)	2 (2)	1 (1)	32 (31)
Total[3]	207 (40)	178 (62)	90 (61)	26 (1)	501 (164)

	State of Residence of Permit Holder				
Gear Type	California	Oregon	Washington	Other States	Total
Trawl	103 (0)	120 (1)	48 (1)	3 (0)	274 (2[4])
Longline	90 (33)	48 (43)	62 (58)	4 (3)	204 (137)
Pot	6 (6)	20 (19)	6 (6)	0 (0)	32 (31)
Total[3]	197 (39)	183 (59)	114 (63)	7 (3)	501 (164)

[1] Source: Jim Hastie (NMFS, Northwest Fisheries Science Center, Seattle, WA).

[2] Permit holders who made no shoreside landings during 1995-1998 include catcher-processors, as well as whiting catcher boats who delivered to motherships and permit holders who did not participate at all in the groundfish fishery during 1995-1998.

[3] State totals may be less than the sum across gear types, since a small number of permits have multiple gear endorsements.

[4] Fixed gear permit holders wishing to participate in the regular or mop-up sablefish season are required to have a sablefish endorsement. The small number of trawl permits appearing in the table with a sablefish endorsement pertains to permits endorsed for fixed gear as well as trawl.

Table II-6. Estimated number of vessels making directed and bycatch groundfish landings in the open access fishery, by state, 1995-1998.[1]

Year	# OA Vessels Making **Directed** Groundfish Landings			
	California	Oregon	Washington	Coastwide
1995	980	224	73	1,277
1996	1,002	202	61	1,265
1997	1,002	258	76	1,336
1998	779	232	50	1,061
# Unique Vessels (1995-1998)	2,064	507	152	2,723

Year	# OA Vessels Making **Bycatch** Groundfish Landings			
	California	Oregon	Washington	Coastwide
1995	659	319	41	1,019
1996	642	323	49	1,014
1997	634	349	64	1,047
1998	520	305	40	865
# Unique Vessels (1995-1998)	1,359	553	112	2,024

[1] Source: Jim Hastie (NMFS, Northwest Fisheries Science Center, Seattle, WA).
Each groundfish open access vessel was assigned to the same state across all years, based on the state accounting for the plurality of the vessel's total open access revenue in the most recent year fished (1995-1998). Of the 2,723 vessels that participated in the directed fishery and the 2,024 that participated in the bycatch fishery during 1995-1998, 1,231 vessels participated in both.

Table II-7. Estimates of number of highliners needed to harvest the 2000 non-whiting groundfish OYs, by fishery sector (limited entry fixed gear, limited entry trawl, open access targeting groundfish).[1]

Limited Entry Fixed Gear[2]

Non-Sablefish

Year	# Vessels	Cumulative Mt
1984	- - - - - Not applicable- - - - -	
1985	- - - - - Not applicable- - - - -	
1986	61	989
1987	41	990
1988	63	986
1989	24	988
1990	23	1,002
1991	25	994
1992	21	1,003

Fixed gear non-sablefish "target"=985 mt
Estimated # fixed gear vessels needed=25
Total # fixed gear permits=205
% current fixed gear permits needed=12%

Sablefish

Year	# Vessels	Cumulative Mt
1984	9	2,485
1985	10	2,430
1986	13	2,523
1987	14	2,459
1988	20	2,488
1989	17	2,452
1990	25	2,448
1991	51	2,436
1992	- - - - - Not applicable- - - - -	

Fixed gear sablefish target=2,430 mt
Estimated # fixed gear vessels needed=15
Total # fixed gear sablefish permits=161
% current fixed gear sablefish permits needed=9%

Limited Entry Trawl

Year	# Vessels	Cumulative Mt
1984	82	37,866
1985	76	37,918
1986	80	37,846
1987	72	37,741
1988	68	37,986
1989	60	37,832
1990	67	37,905
1991	73	37,747
1992	86	37,735

Trawl non-whiting target = 37,612 mt
Est. # trawlers needed for non-whiting=70
whiting vessels=37
Total # shoreside trawl permits=264

% current trawl permits needed (high)=41%
% current trawl permits needed (low)=27%

Open Access Targeting Groundfish

Year	# Vessels	Cumulative Mt
1984	13	2,222
1985	25	2,218
1986	52	2,222
1987	53	2,208
1988	83	2,214
1989	83	2,212
1990	105	2,215
1991	69	2,224
1992	47	2,218

Open access target=2,207 mt
Est. # vessels needed (high)=100
Est. # vessels needed (low)=50
Total # OA vessels targeting groundfish=794
% current OA vessels needed (high)=13%
% current OA vessels needed (low) =6%

[1] Source: Jim Hastie (NMFS, Northwest Fisheries Science Center, Seattle, WA).
[2] Fixed gear permit holders landed less than the 2000 target for non-sablefish groundfish in 1984-1985 and less than the 2000 target for sablefish in 1992.

Table II-8. Dates of Pacific whiting season, by fishery sector and year, 1991-1999.[1]

	Shoreside - CA		Shoreside-OR,WA		
Year	So of 40°30'N lat	40°30' to 42°N lat	No of 42°N lat	Catcher-processors	Motherships
1991	Late Mar-Dec 31			Late Mar-Aug 29	Late Mar-Sep 6 (Nov 16-Dec 31)?
1992	Apr 15-Oct 31			Apr 15-May 5 (Sep 4-12, Oct 1-7)	
1993	Apr 15-Sep 4			Apr 15-May 5	
1994	Mar 1-Dec 31		Apr 15-Dec 31	Apr 15-May 13 (Oct 1-5)	
1995	Mar 1-Jul 24		Apr 15-Jul 24	Apr 15-May 4	
1996	Mar 1-Sep 10		May 15-Sep 10	May 15-Jun 1	
1997	Late Apr-May 27 (Jun 15-Aug 22)		Jun15-Aug 22	May 15-Jun 11	May 15-Jun 1
1998	Apr 15-Oct 13	Apr 1-Oct 13	June 15-Oct 13	May 15-Aug 7	May 15-May 31
1999	Apr 15-Sep 13	Apr 1-Sep 13	June 15-Sep 13	May 15-Jul 21	May 15-Jun 2

[1] Sources: PFMC (1995, pp.30-35); PFMC (1999a, pp. 15-21).
Dates in parentheses pertain to periods when the season was reopened to allow full utilization of the harvest guideline..

Table II-9. January 1 trip limits (pounds/trip) and monthly-equivalent vessel landings limits (pounds/vessel/month) for the *sebastes* complex north, by species and year, 1983-2000.[1]

Year	*Sebastes* Complex North	Pacific Ocean Perch	Widow	Yellowtail	Canary	Minor Slope	Minor Shelf	Minor Nearshore
1983	40K*	Max(10%,5K)*	30K*					
1984	120K**	Max(10%,5K)*	200K**					
1985	120K	20%*	120K**	40K				
1986	100K	Min(20%,10K)*	120K	40K				
1987	100K	Min(20%,5K)*	120K	40K				
1988	100K	Min(10%,5K)*	120K	40K				
1989	100K	Min(10%,5K)*	120K	30K				
1990	100K	Min(20%,3K)*	60K	30K				
1991	100K	Min(20%,3K)*	40K	20K				
1992	100K	Min(20%,3K)*	30K	16K				
1993	100K	Min(20%,3K)*	30K	16K				
1994	80K	Min(20%,3K)*	30K	22K[2]				
1995	42.5K[2]	6K	30K	22K[2]	6K			
1996	42.5K[2]	5K	35K	25.5K[2]	9K			
1997	15K	4K	35K	3K	7K			
1998	20K	4K	12.5K	5.5K	7.5K			
1999	10.8K[3]	4K	17.3K[3]	5.8K[3]	3.8K[3]			
2000	13.1K[4]	1.5K[3]	15K	10K[3]	0.2K[3]	2K[3]	0.7K[3]	0.2K

[1] Sources: PFMC (1999a, pp. T-29 to T-60); PFMC (1999b).
* denotes trip limit without trip frequency limit and ** denotes trip limit combined with frequency limit of one trip per week. All ** and non-asterisked elements in this table are reported as monthly-equivalent limits.
The geographic boundary used to distinguish *sebastes* north and south has changed over time. The dividing line was the boundary between the Vancouver and Eureka management areas in 1984, Cape Blanco OR in 1985, Coos Bay OR in 1986-1991 and 1993, Cape Lookout OR in 1992 and 1994, and Cape Mendocino CA during 1995-2000 (PFMC 1999b, Table 29).

Table II-9 (cont.)

[2] During 1995-1996, the monthly-equivalent limit for *sebastes* north was 35K pounds north of Cape Lookout OR and 50K pounds between Cape Lookout and Cape Mendocino CA. During 1994-1995, the monthly-equivalent limit for yellowtail rockfish was 14K pounds in the north and 30K pounds in the south; in 1996, the limit was changed to 16K pounds in the north and 35K pounds in the south. Each of these pairs of numbers are reported in the table as the average for the two subareas.

[3] During 1999-2000, the monthly-equivalent limits for most components of the *sebastes* north complex varied within as well as across years. For each of these components, the numbers reported in the table represented average values obtained by weighting each of the monthly-equivalent limits for the component by the proportion of the year in which each of these limits was effective, as follows:

1999	Jan-Mar	Apr-Sep	Oct-Dec	Weighted Avg
Seb No	8.0K	12.5K	10K	10.8K
Widow	23.3K	8.0K	30K	17.3K
Yellowtail	5.0K	6.5K	5K	5.8K
Canary	3.0K	4.5K	3K	3.8K

2000	Jan-Apr	May-Oct	Nov-Dec	Weighted Avg
POP	0.5K	2.5K	0.5K	1.5K
Yellowtail	5.0K	15.0K	5.0K	10.0K
Canary	0.1K	0.3K	0.1K	0.2K
Minor Slope	1.5K	2.5K	1.5K	2.0K
Minor Shelf	0.3K	1.0K	0.3K	0.7K

[4] Prior to 2000, the *sebastes* north limit included all *sebastes* stocks other than POP and widow, which had been subject to their own separate limits since the FMP was first implemented. Yellowtail and canary limits were implemented in later years as sublimits of the *sebastes* north limit until 2000, when the *sebastes* north limit was abandoned in favor of separate limits on individual *sebastes* species/species groups. Thus the *sebastes* north limit reported in the table for 2000 does not represent a limit imposed by the Council, but was derived by summing the monthly-equivalent limits for all individual species groups except (to maintain consistency with earlier years of the time series) POP and widow. The purpose of including this summation in the table is to provide a comparable basis for relating the 2000 *sebastes* landings limits to limits in prior years.

Table II-10. January 1 trip limits (pounds/trip) and monthly-equivalent vessel landings limits (pounds/vessel/month) for the *sebastes* complex south, by species and year, 1983-2000.[1]

Year	*Sebastes* Complex South	Pacific Ocean Perch	Widow	Bocaccio	Canary	Chilipepper	Splitnose	Cowcod	Minor Slope	Minor Shelf	Minor Nearshore
1983	40K*	Max(10%,5K)*	30K*								
1984	40K*	Max(10%,5K)*	200K**								
1985	40K*	20%*	120K**								
1986	40K*	Min(20%,10K)*	120K								
1987	40K*	Min(20%,5K)*	120K								
1988	40K*	Min(20%,5K)*	120K								
1989	40K*	Min(20%,5K)*	120K								
1990	40K*	Min(20%,3K)*	60K								
1991	25K*	Min(20%,3K)*	40K	5K*							
1992	100K	Min(20%,3K)*	30K	20K							
1993	100K	Min(20%,3K)*	30K	20K							
1994	80K	Min(20%,3K)*	30K	30K							
1995	100K	6K	30K	30K	6K						
1996	100K	5K	35K	30K	9K						
1997	75K	4K	35K	6K	7K						
1998	75K	4K	12.5K	1K	7.5K						
1999	28.4K[3]	4K	17.3K[2]	.75K	3.8K[2]	14.5K[2]	9.9K[2]				
2000	21.7K[3]	1.5K[2]	15K	0.4K[2]	0.2K[2]	12.5K	5.6K[2]	1 fish*	2.0K[2]	0.8K[2]	.2K

[1] Sources: PFMC (1999a, pp. T-29 to T-60); PFMC (1999b).

* denotes trip limit without trip frequency limit and ** denotes trip limit combined with frequency limit of one trip per week. All ** and non-asterisked elements in this table are reported as monthly-equivalent limits.

The geographic boundary used to distinguish *sebastes* north and south has changed over time. The dividing line was the boundary between the Vancouver and Eureka management areas in 1984, Cape Blanco OR in 1985, Coos Bay OR in 1986-1991 and 1993, Cape Lookout OR in 1992 and 1994, and Cape Mendocino CA during 1995-2000 (PFMC 1999b, Table 29).

Table II-10 (cont.)

[2] During 1999-2000, the monthly equivalent limits for most components of the *sebastes* south complex varied within as well as across years. For each of these components, the numbers reported in the table represented average values obtained by weighting each of the monthly-equivalent limits for the component by the proportion of the year in which each of these limits was effective, as follows:

1999	Jan-Mar	Apr-Sep	Oct-Dec	Weighted Avg
Seb So	4.3K	3.3K	5K	4.0K (Council-mandated, excludes chilipepper and splitnose)
Widow	23.3K	8.0K	30K	17.3K
Canary	3.0K	4.5K	3K	3.8K
Chilipepper	15.0K	12.5K	18K	14.5K
Splitnose	10.7K	9.5K	10K	9.9K

2000	Jan-Apr	May-Oct	Nov-Dec	Weighted Avg
POP	0.5K	2.5K	0.5K	1.5K
Bocaccio	0.3K	0.5K	0.3K	0.4K
Canary	0.1K	0.3K	0.1K	0.2K
Splitnose	4.3K	7.0K	4.0K	5.6K
Minor Slope	1.5K	2.5K	1.5K	2.0K
Minor Shelf	0.5K	1.0K	0.5K	0.8K

[3] Prior to 1999, the *sebastes* south limit included all *sebastes* stocks other than POP and widow, which had been subject to their own separate limits since the FMP was first implemented. Bocaccio and canary limits were implemented in later years as sublimits of the overall *sebastes* south limit. In 1999, chilipepper and splitnose were removed from the *sebastes* south limit and (like POP and widow) received their own separate landings limits. In 2000, the *sebastes* south limit was abandoned in favor of separate limits on individual *sebastes* species/species groups. Thus, for 1999, the *sebastes* south limit reported in the table was derived by adding the Council's monthly-equivalent *sebastes* south limit (which was 4,000 pounds, excluding POP, widow, bocaccio and canary) to the individual bocaccio and canary limits reported in the table. For 2000 the *sebastes* south limit reported in the table does not represent a limit imposed by the Council, but was derived by summing the monthly-equivalent limits for all individual species groups except (to maintain consistency with earlier years of the time series) POP and widow. The purpose of these adjustments was to provide a comparable basis for relating the 1999-2000 *sebastes* south limits limits in prior years.

Table II-11. January 1 trip limits (pounds/trip) and monthly-equivalent vessel landings limits (pounds/vessel/month) for lingcod and the deepwater complex, by species and year, 1988-2000.[1]

Year	Lingcod	DTS	Trawl Sablefish: Trip Limits	Trawl Sablefish: Monthly Equiv Lim	Thornyheads	Shortspine Thornyhead	Longspine Thornyhead	Dover Sole
1988			Max(20%,6K)*					
1989			Max(25%,1K)*					
1990			Max(25%,1K)*					
1991		110K	Max(25%,1K)*		30K			
1992		110K	Max(25%,1K)*		50K			
1993		90K	Max(25%,1K)*		40K			
1994		50K	Max(25%,1K)*	12K	30K			
1995	20K	42.5K[2]	Max(25%,1K)*	6K	20K	4K		
1996	20K	42.5K[2]		6K	10K	2K		
1997	20K	42.5K[2]		6K	10K	2K		19K
1998	.5K	20.3K[4]		2.5K		2K	5K	10.8K[3]
1999	.5K	26.4K[4]		5.1K[3]		1K	4K	16.3K[3]
2000	.4K	26.7K[4]		4.3K[3]		1K[3]	4K[3]	17.5K[3]

[1] Sources: PFMC (1999a, pp. T-29 to T-60); PFMC (1999b).
* denotes trip limit. All other elements of this table are reported as monthly-equivalent limits..
DTS pertains to the deepwater complex, which includes Dover sole, thornyheads and sablefish.
In addition to the landings limits on legal-size sablefish reported here, trip limits on sublegal sablefish (<22") have also been imposed since 1983.

[2] During 1995-1997, the monthly-equivalent DTS limit was 35K pounds north of and 50K pounds south of Cape Mendocino CA. These limits are reported in the table as the average for the two areas (42.5K pounds).

Table II-11 (cont.)

[3] During 1998-2000, the monthly equivalent limits for many DTS components varied within as well as across years. For each of these components, the numbers reported in the table represented average values obtained by weighting each of the monthly-equivalent limits for the component by the proportion of the year in which each of these limits was effective, as follows:

1998	Jan-Feb	Mar-Dec	Weighted Avg
Dover sole	20.0K	9.0K	10.8K

1999	Jan-Mar	Apr-Sep	Oct-Dec	Weighted Avg
Sablefish	4.3K	5.0K	6.0K	5.1K
Dover sole	23.3K	10.0K	22.0K	16.3K

2000	Jan-Apr	May-Oct	Nov-Dec	Weighted Avg
Sablefish	3.5K	5.0K	3.5K	4.3K
Shortspine	1.5K	0.5K	1.5K	1.0K
Longspine	6.0K	2.0K	6.0K	4.0K
Dover sole	27.5K	10.0K	20.0K	17.5K

[4] During 1998-2000, the overall DTS limit was abandoned in favor of separate limits on individual DTS species. Thus the DTS limits reported in the table for 1998-2000 do not represent limits imposed by the Council but were derived by summing the monthly-equivalent limits for each component of the complex. The purpose of including these summations in the table is to provide a comparable basis for relating the 1998-2000 DTS landings limits to limits in prior years.

Table II-12. Daily limits (pounds/day), trip limits (pounds/trip) and monthly-equivalent limits (pounds/month) for groundfish open access participants using open access gear and exempted trawl gear, by species category and year, 1994-2000.[1]

Species Category	1994	1995	1996	1997	1998	1999	2000
Monthly Equivalent Limits for *Sebastes* North and South Taken with Open Access Gear:[2]							
Sebastes north	40,000	35,000	35,000	40,000	40,000	5,700[3]	4,100[3]
Canary						1,000	50
Yellowtail						2,600	100
Widow						2,000	3,000
Pac ocean perch						100	100
Minor slope rockfish							250
Minor shelf rockfish							100
Minor nearshore rockfish							500
Sebastes south	40,000	40,000	40,000	40,000	40,000	10,200[3]	6,275[3]
Canary						1,000	50
Bocaccio-not set/trammel net				2,000	1,000	500	200
Bocaccio-set/trammel net				4,000	2,000	1,000	
Widow						2,000	3,000
Chilipepper						6,000	2,000
Splitnose						100	200
Pacific ocean perch						100	100
Cowcod							1 fish
Minor slope rockfish							250
Minor shelf rockfish							200
Minor nearshore rockfish							275
Daily Limits for Thornyheads Taken with Open Access Gear:[4]							
North			50	0	0	0	0
South		50	50	50	50	50	50
Daily Limits for Sablefish Taken with Open Access Gear:[5]							
North	250	300	500	300	300	300	300
South	350	350	350	350	350	350	350
Monthly Equivalent Limits for Other Groundfish Taken with Open Access Gear:							
Lingcod[6]					500	250	400
Dover sole[7]						100	
Arrowtooth flounder							200
Other flatfish							300
Pacific whiting						100	100

Table II-12 (cont.)

Species Category	1994	1995	1996	1997	1998	1999	2000
Trip Limits for Groundfish Taken with Exempted Trawl Gear:[8]							
Pink shrimp	1,500	1,500	1,500	500	500	500	500
Spot/ridgeback prawn	1,000	1,000	1,000	500	500	300	300
CA halibut/sea cucumber	500	500	500	500	500	300	300

[1] Sources: PFMC (1999a, pp. T-29 to T-60); PFMC (1999b).

[2] Separate *sebastes* limits were set north and south of Point Lookout OR in 1994, and north and south of Cape Mendocino, CA since 1995. In addition to being subject to cumulative landings limits, *sebastes* north and south were also subject to a 10,000 pound trip limit during 1994-1998; bocaccio was subject to a trip limit of 300 pounds in 1997 and 250 pounds in 1998. In 2000, canary, bocaccio, widow, chilipepper, cowcod, minor shelf rockfish and minor nearshore rockfish in the south were subject to season closures as well as landings limits. In 2000, no more than 50% of the landings limit for minor nearshore rockfish in the south can be species other than blue and black rockfish. For cowcod, the 2000 limit of one fish is a limit per landing, not a monthly-equivalent limit.

[3] The 1999 canary and yellowtail limits in the north were implemented as sublimits of the *sebastes* north limit; the 1997-1999 bocaccio limits in the south were implemented as sublimits of the *sebastes* south limit. In 1999, widow and POP (which had been included in the Council's *sebastes* north limit in prior years) became subject to their own separate limits; similarly, widow, chilipepper, splitnose and POP (which had been included in the Council's *sebastes* south limit in prior years) also became subject to their own separate limits. The *sebastes* limits reported in the table for 1999 reflect adjustments made to ensure comparability with earlier years. For *sebastes* north, this was done by adding the Council's *sebastes* north limit (which was 3,600 pounds, excluding widow and POP) to the individual widow and POP limits reported in the table. For *sebastes* south, this was done by adding the Council's *sebastes* south limit (which was 2,000 pounds, excluding widow, chilipepper, splitnose and POP) to the individual widow, chilipepper, splitnose and POP limits reported in the table.
In 2000, the *sebastes* north and south limits were abandoned altogether in favor of separate limits on individual *sebastes* species/species groups. Thus the overall *sebastes* limits reported in the table for 2000 do not represent limits imposed by the Council, but were derived by summing the individual species limits. The purpose of including this summation in the table is to provide a comparable basis for relating the 2000 *sebastes* landings limits to limits for prior years.

[4] Separate limits are set for thornyheads north and south of Point Conception.

[5] Separate limits are set for sablefish north and south of 36ºN latitude. In addition to being subject to a daily limit, sablefish in the north was also subject to cumulative limits during 1997-2000.

Table II-12 (cont.)

[6] Lingcod was subject to a four-month closure in 1999 and a six-month closure in 2000 in addition to landings limits.

[7] Dover sole is included in “Other flatfish” in 2000.

[8] Vessels using exempted trawl gear are also bound by the limits and closures adopted for open access gear.

Table II-13. Dates and duration of the fixed gear sablefish season, by year, 1983-1999.[1]

Year	Season	# Days
1983	Jan 1-Dec 31	364
1984	Jan 1-Dec 31	365
1985	Jan 1-Dec 6	339
1986	Jan 1-Oct 23	295
1987	Jan 1-Oct 14	286
1988	Jan 1-Aug 25	237
1989	Jan 1-Jul 17	197
1990	Jan 1-Jun 24	174
1991	Apr 1-Jul 1	91
1992	May 12-May 27	15
1993	May 12-Jun 1	20
1994	May 15-Jun 4	20
1995	Aug 6-Aug 13 (Sep 1-30)	7 (29)
1996	Sep 1-6 (Oct 1-15)	5 (14)
1997	Aug 25-Sep 3 (Oct 1-22)	9 (21)
1998	Aug 1-7 (Aug 28-Sep 11)	6 (14)
1999	Aug 16-Aug 25 (Sep 20-26)	9 (6)

[1] Source: PFMC (1999a, pp. T-29 to T-60).
Beginning in 1995, dates and duration of the regular season are followed (in parentheses) by dates and duration of the mop-up season.

FIGURE II-1. Annual West Coast Commercial Shoreside Groundfish Landings, by Species Category, 1983-1999

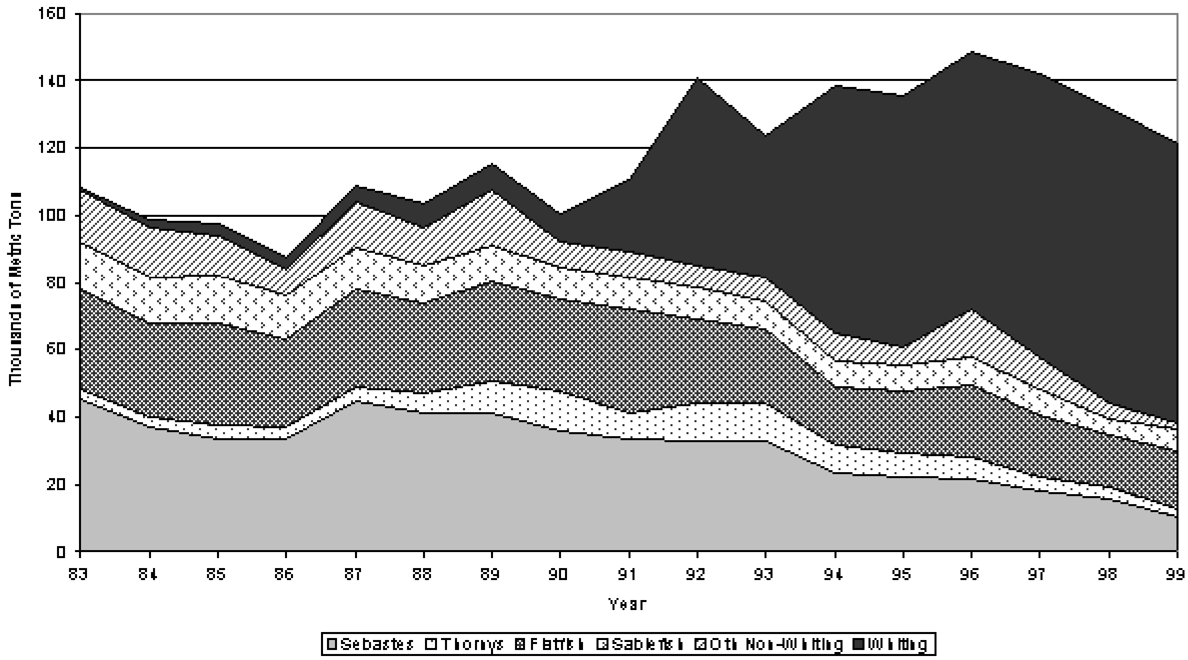


FIGURE II-2. Average Annual Commercial Shoreside Landings of Major West Coast Groundfish Species, by Species Category and Time Period

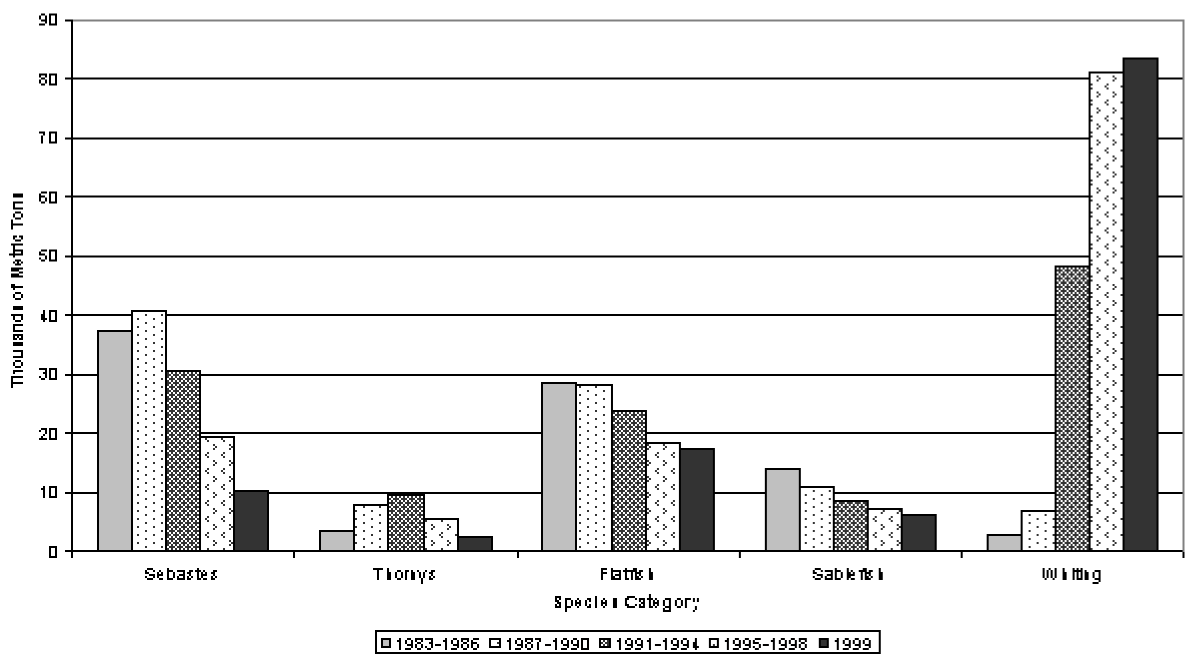


FIGURE II-3. Average Annual Ex-Vessel Prices of Major West Coast Groundfish Species, by Species Category and Time Period

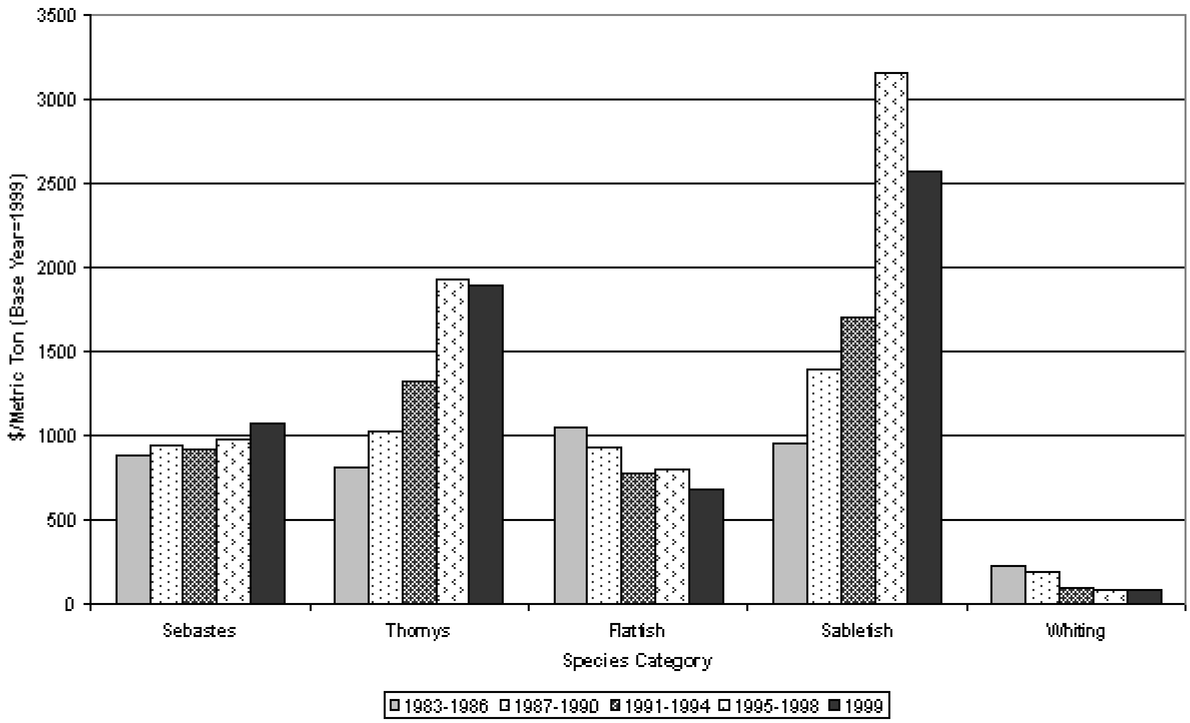


FIGURE II-4. Annual West Coast Commercial Shoreside Groundfish Revenues, by Species Category, 1983-1999

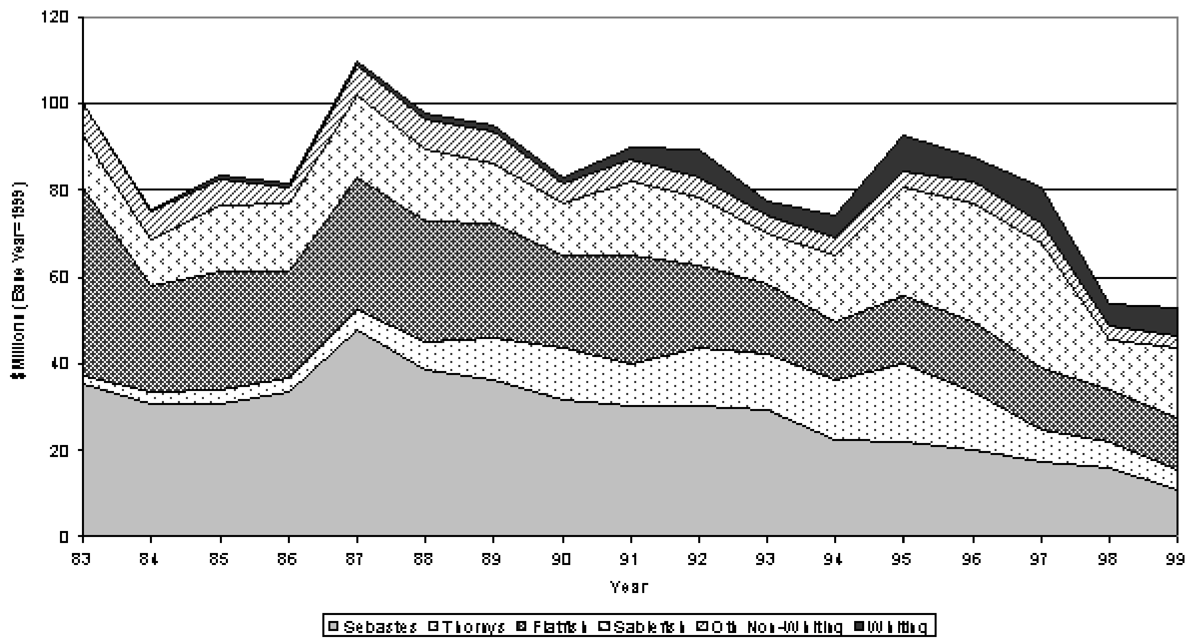


FIGURE II-5. Average Annual Commercial Shoreside Revenues from Major West Coast Groundfish Species, by Species Category and Time Period

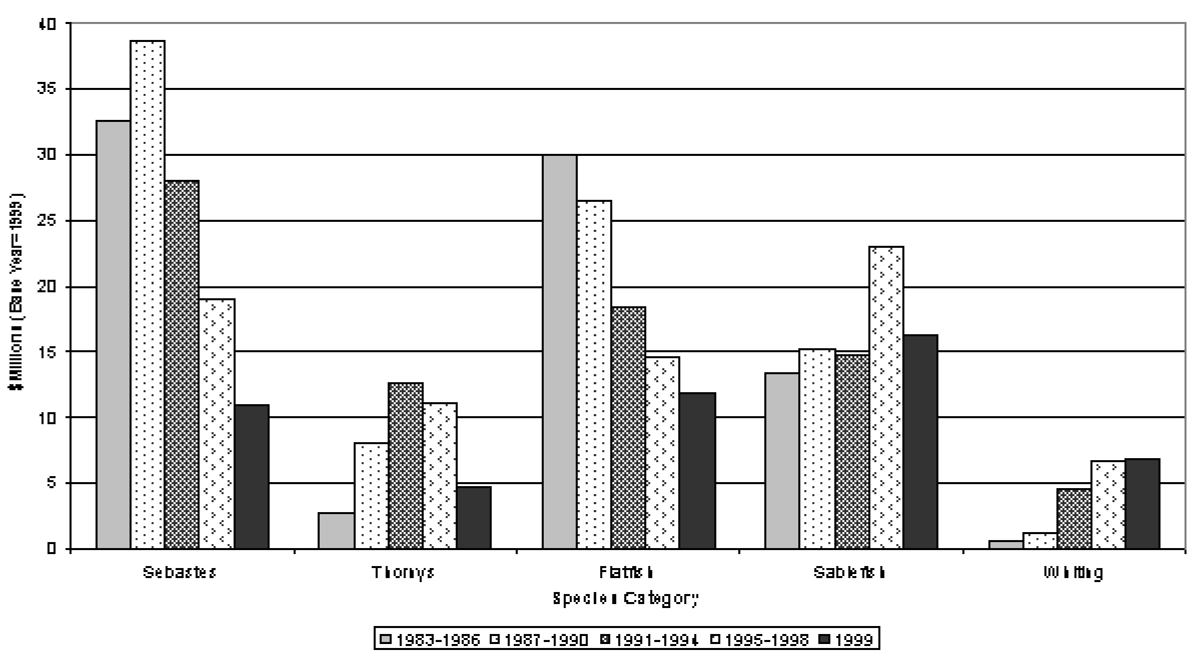


FIGURE II-6. Annual Commercial Non-Whiting Groundfish Landings, by State, 1983-1999

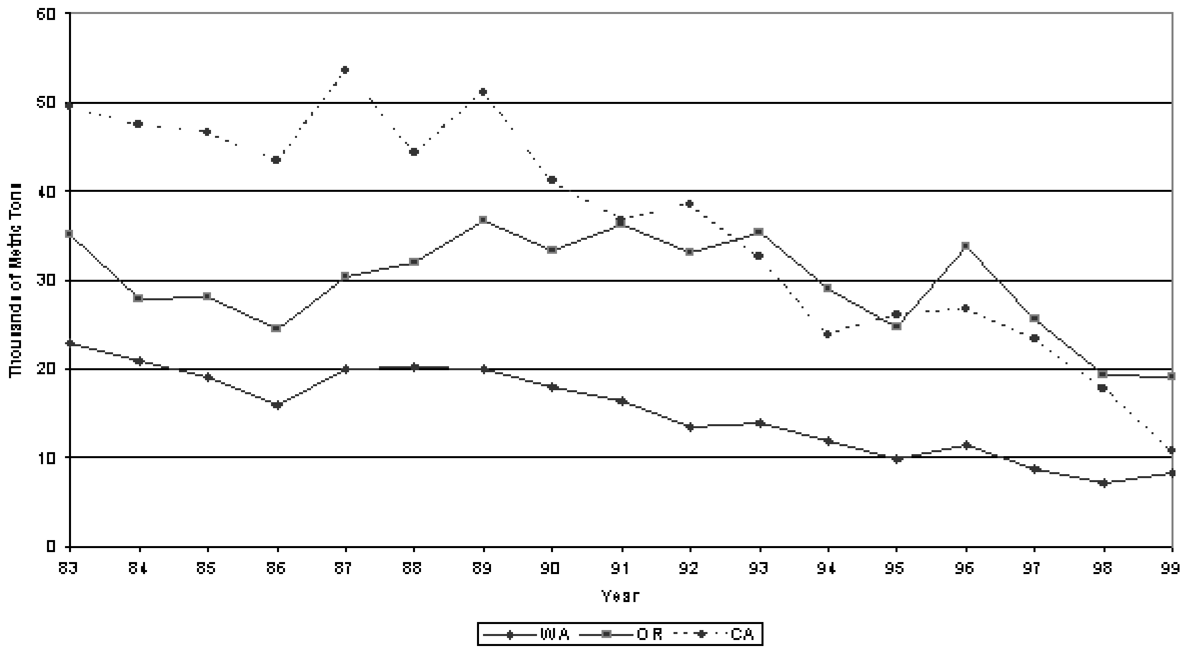


FIGURE II-7. Annual Commercial Non-Whiting Groundfish Revenues, by State, 1983-1999

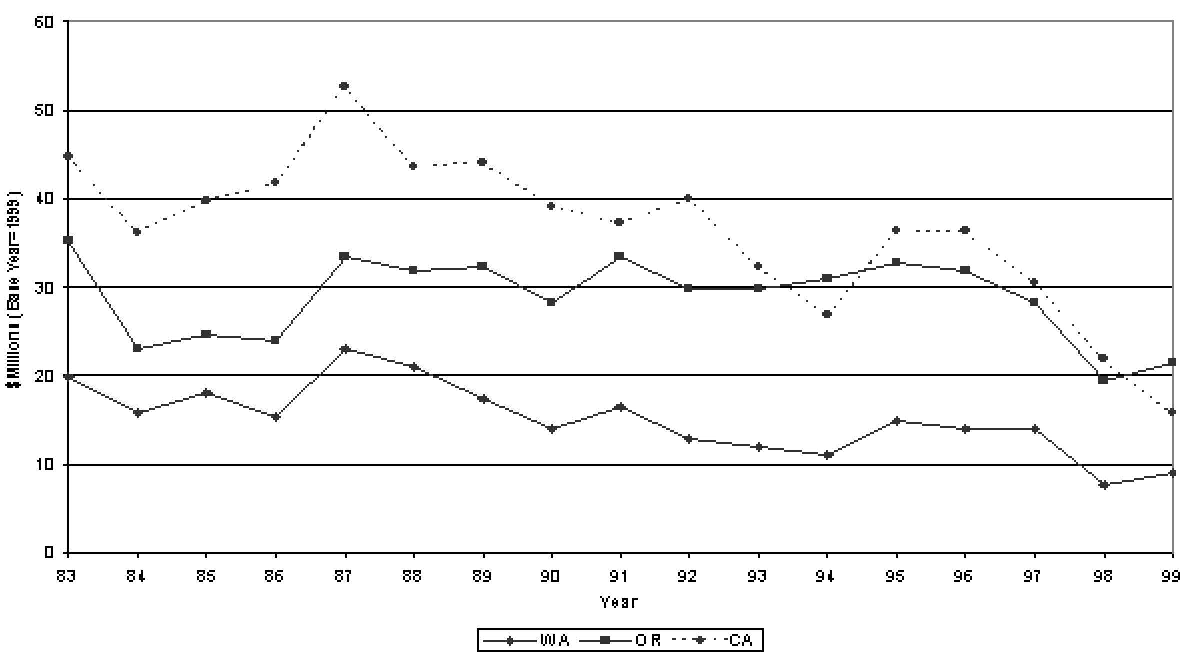


FIGURE II-8. Annual Commercial Whiting Landings, by State, 1983-1999

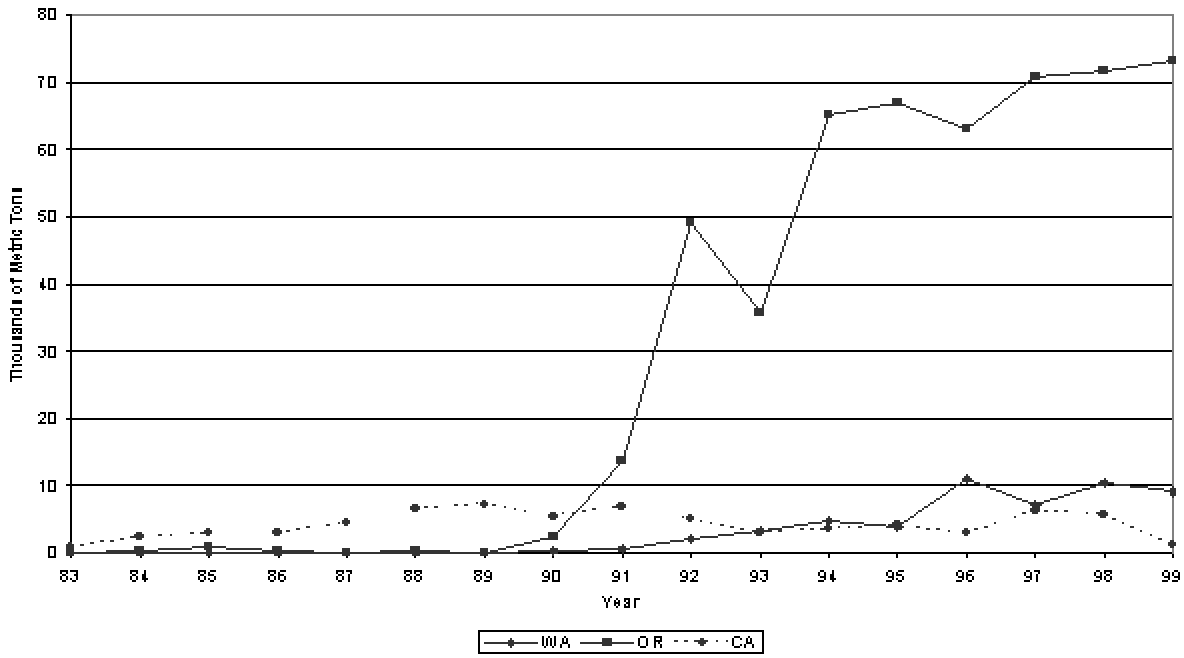


FIGURE II-9. Annual Commercial Whiting Revenues, by State, 1983-1999

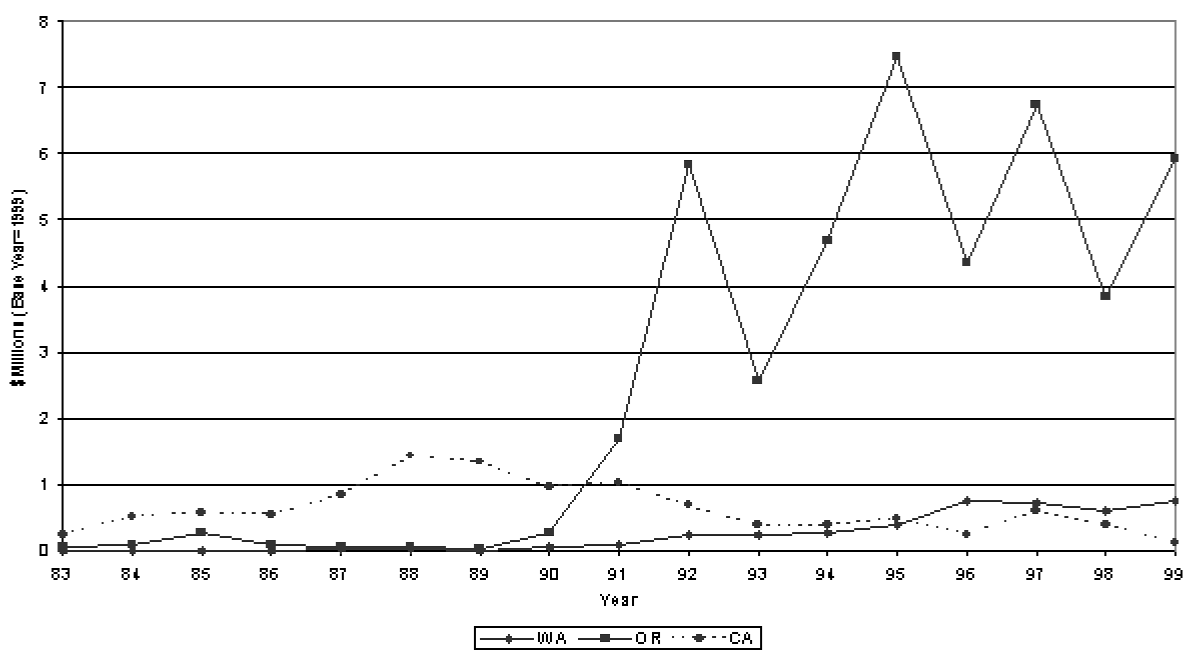


FIGURE II-10. Annual Commercial Groundfish Landings in Washington, by Species Category, 1983-1999

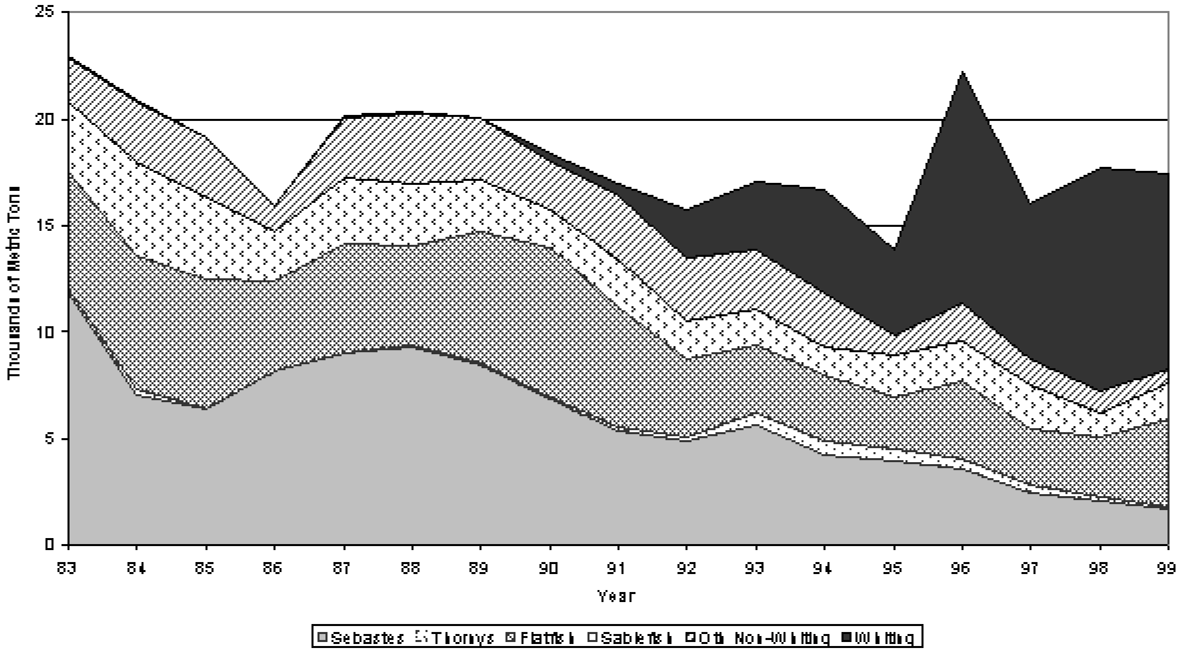


FIGURE II-11. Annual Commercial Groundfish Revenues in Washington, by Species Category, 1983-1999

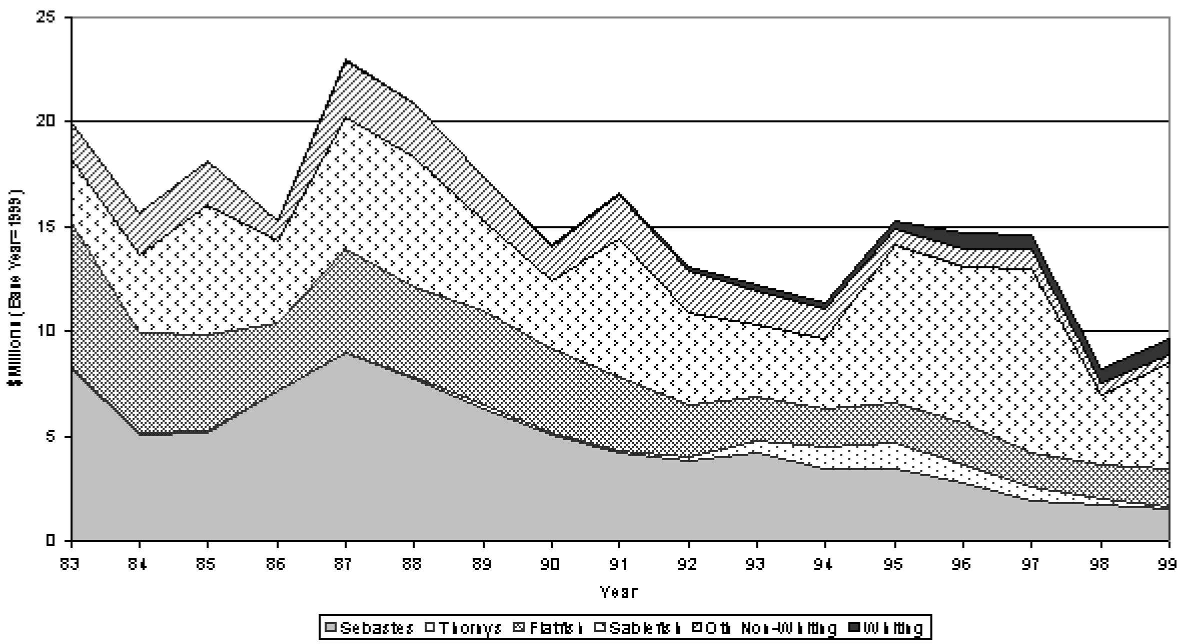


FIGURE II-12. Average Annual Commercial Groundfish Landings in Washington, by Major Species Category and Time Period

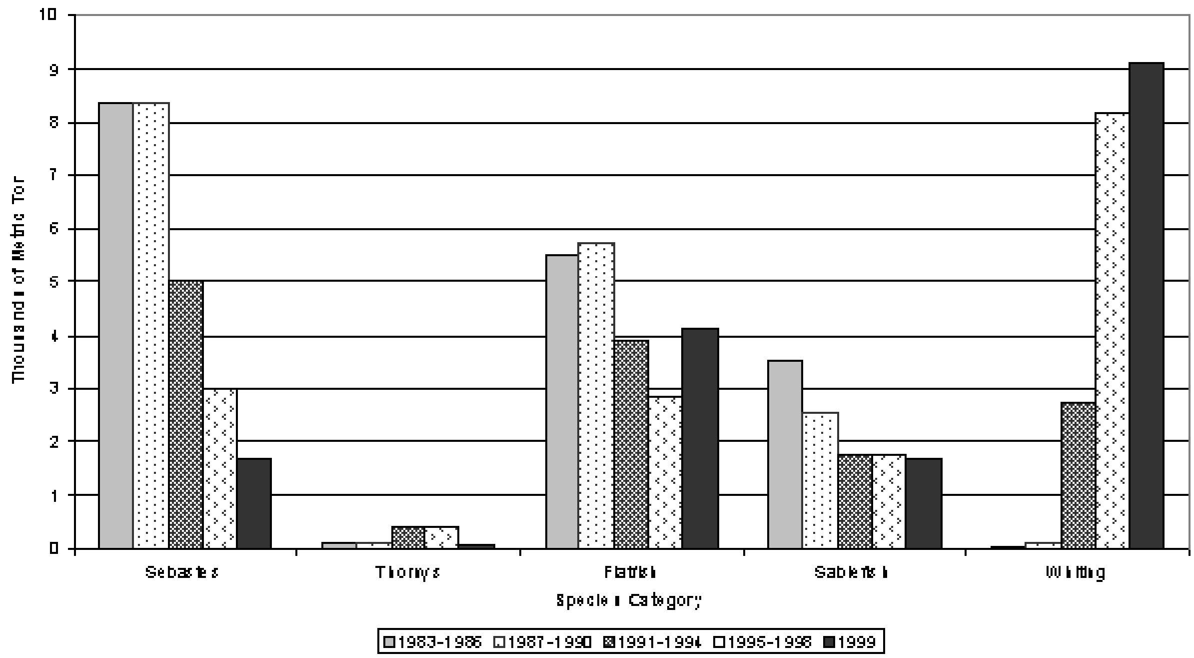


FIGURE II-13. Average Annual Commercial Groundfish Revenues in Washington, by Major Species Category and Time Period

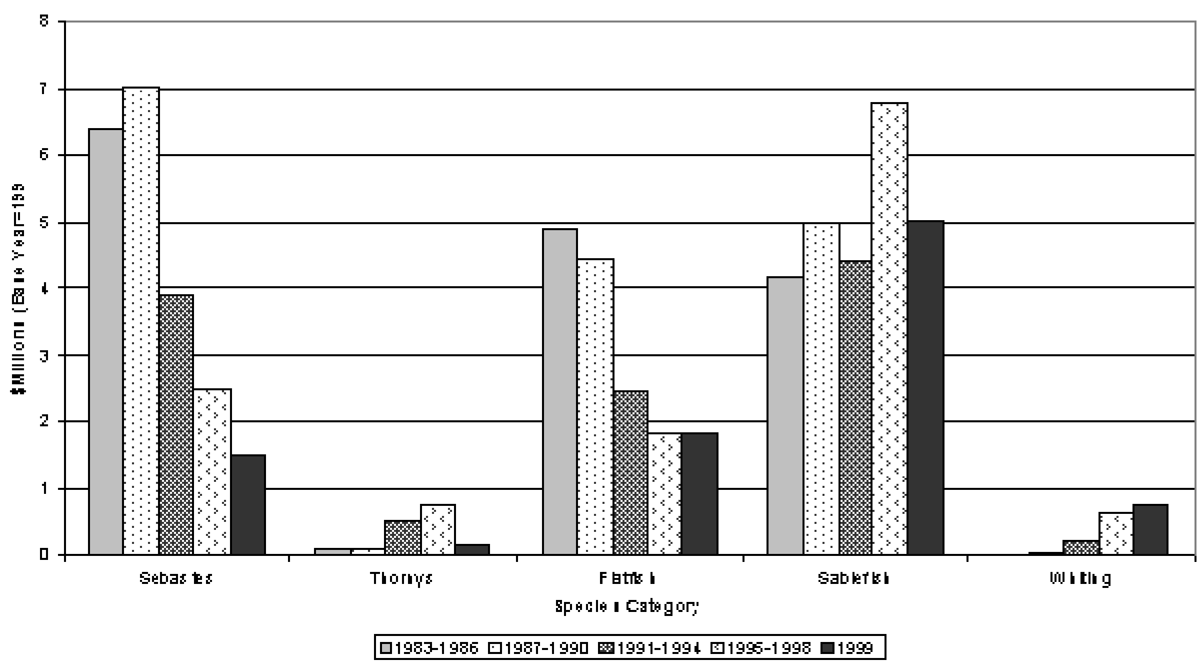


FIGURE II-14. Annual Commercial Groundfish Landings in Oregon, by Species Category, 1983-1999

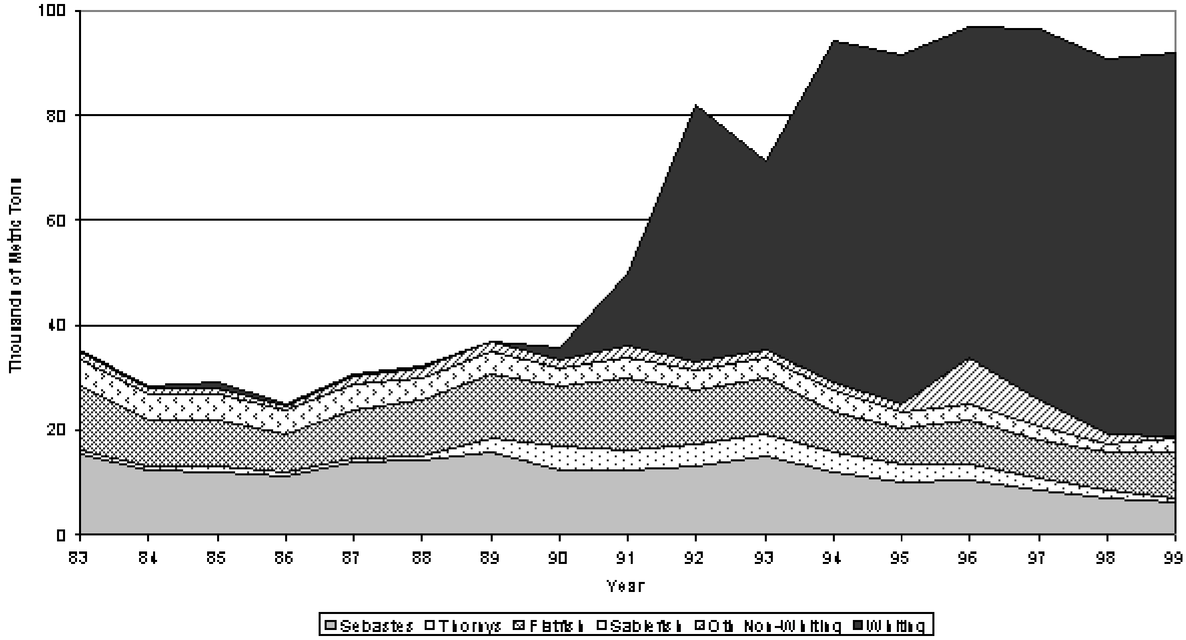


FIGURE II-15. Annual Commercial Groundfish Revenues in Oregon, by Species Category, 1983-1999

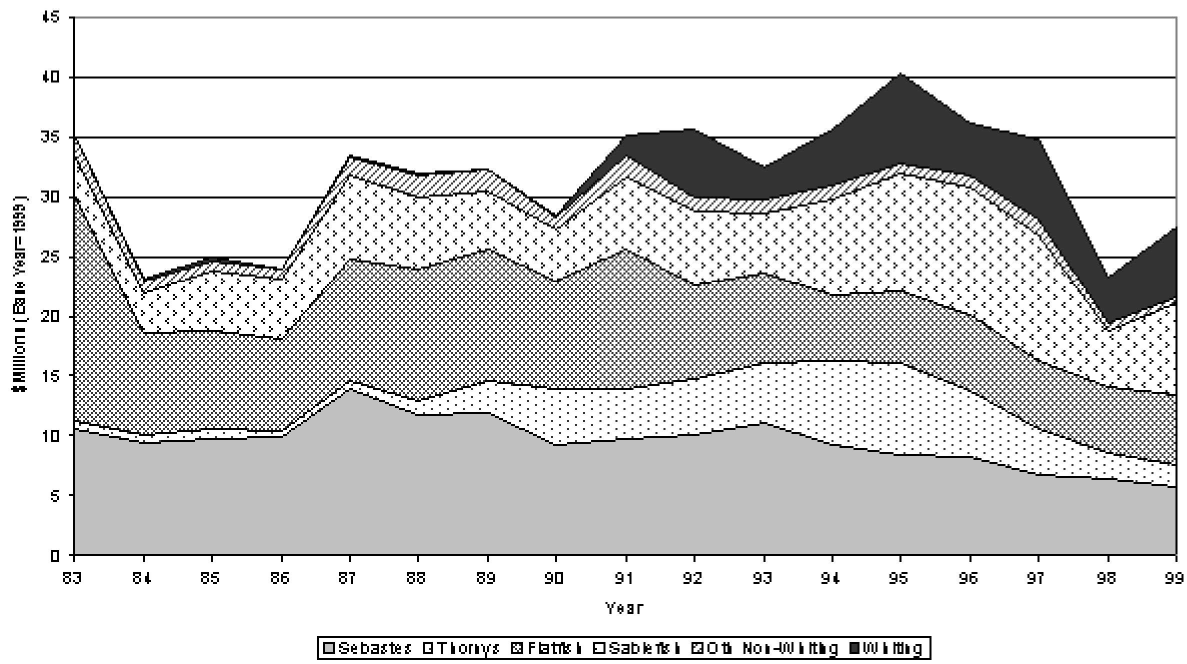


FIGURE II-16. Average Annual Commercial Groundfish Landings in Oregon, by Major Species Category and Time Period

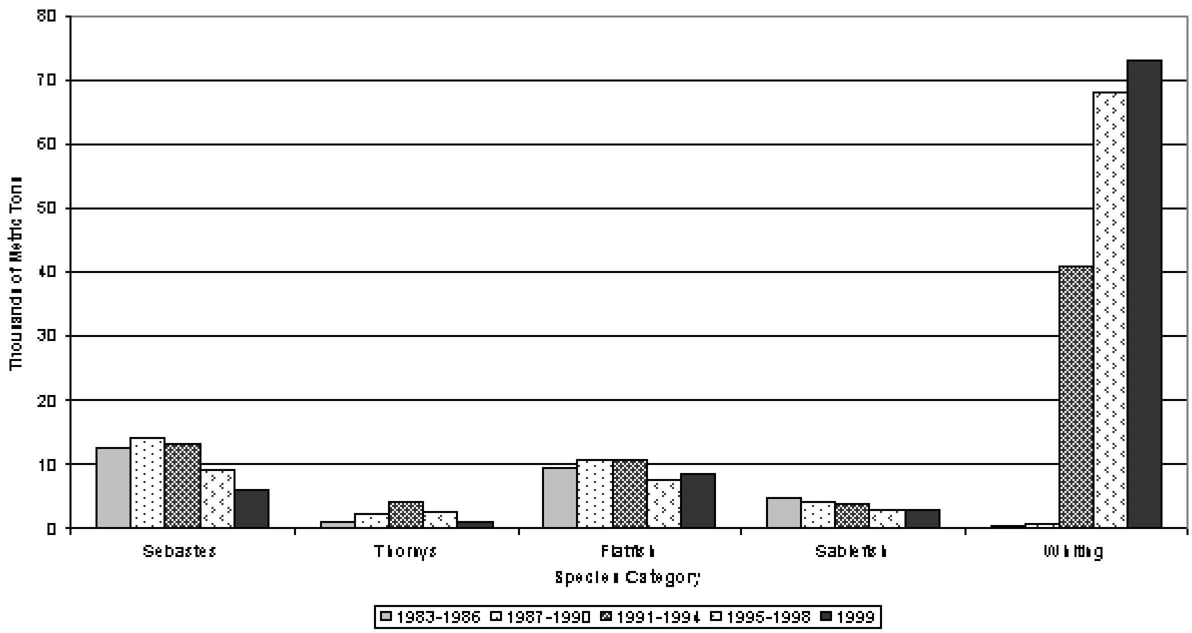


FIGURE II-17. Average Annual Commercial Groundfish Revenues in Oregon, by Major Species Categories and Time Period

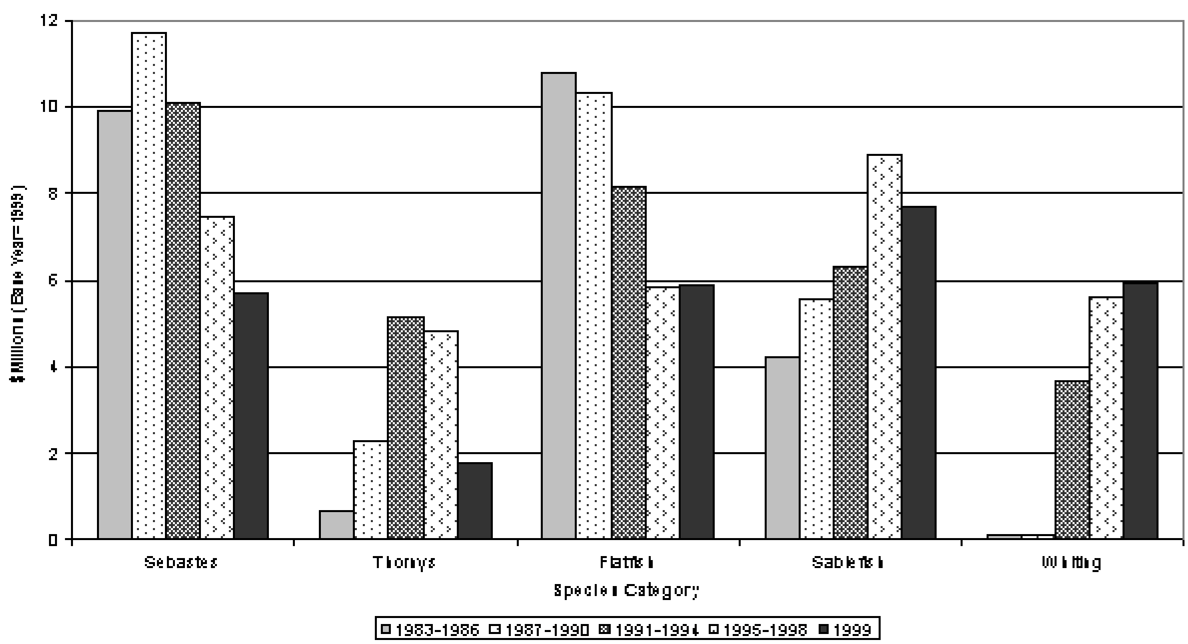


FIGURE II-18. Annual Commercial Groundfish Landings in California, by Species Category, 1983-1999

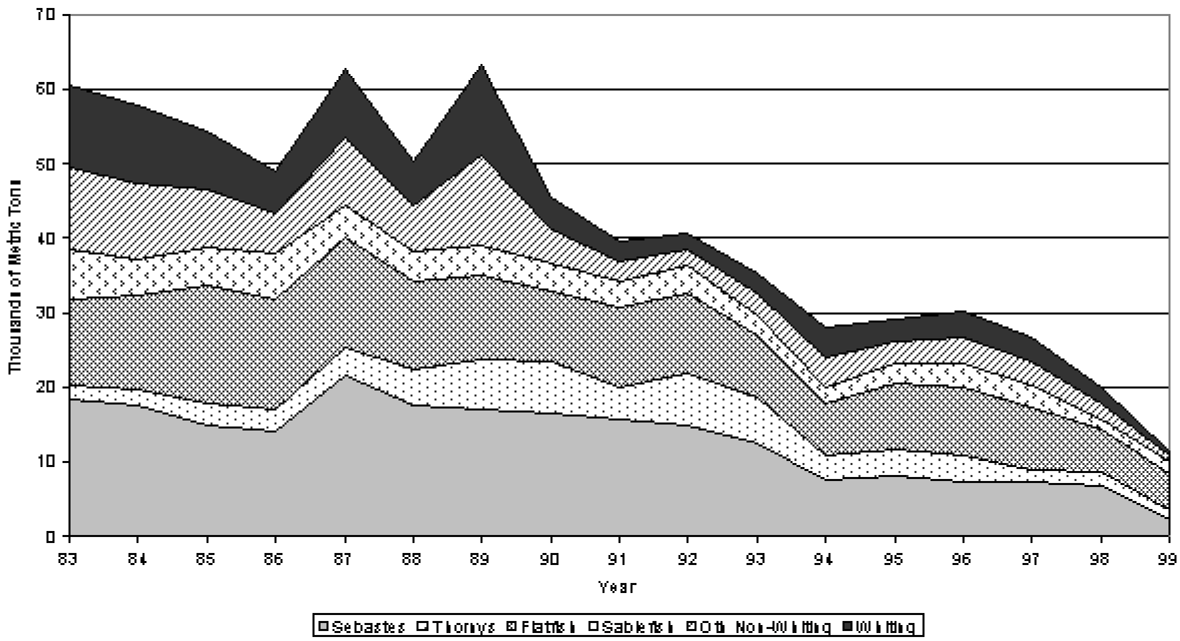


FIGURE II-19. Annual Commercial Groundfish Revenues in California, by Species Category, 1983-1999

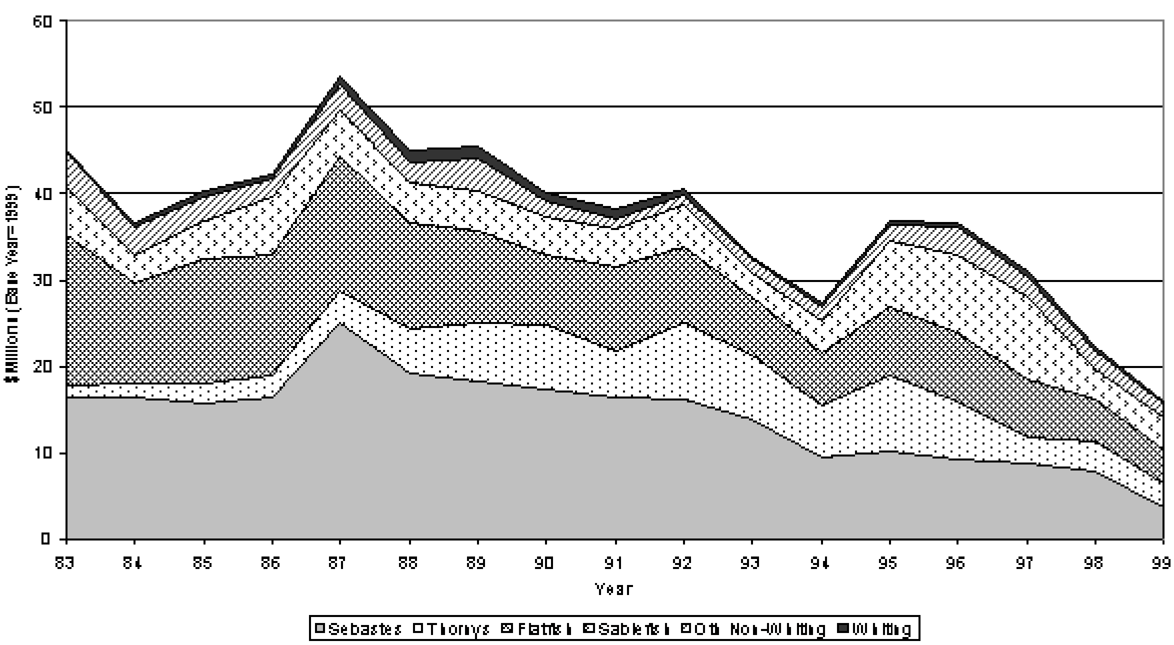


FIGURE II-20. Average Annual Commercial Groundfish Landings in California, by Major Species Category and Time Period

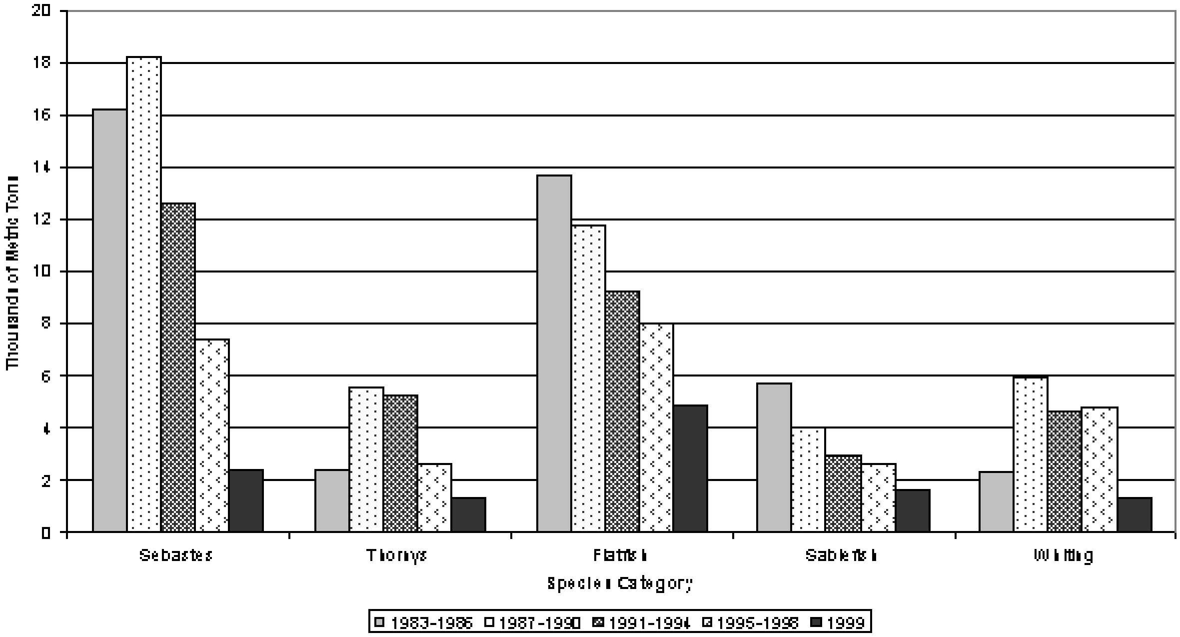


FIGURE II-21. Average Annual Commercial Groundfish Revenues in California, by Major Species Category and Time Period

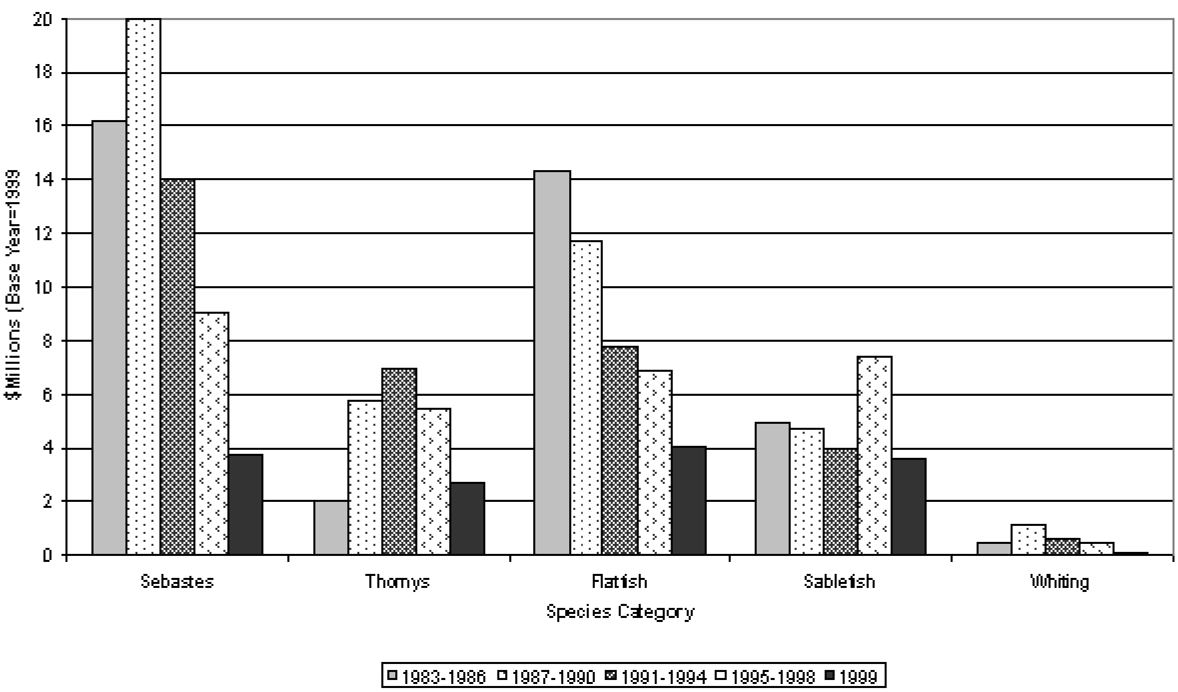


FIGURE II-22. Monthly-Equivalent Cumulative Landings Limits for the Groundfish Limited Entry Fleet, by Major Species Complex, 1984-2000

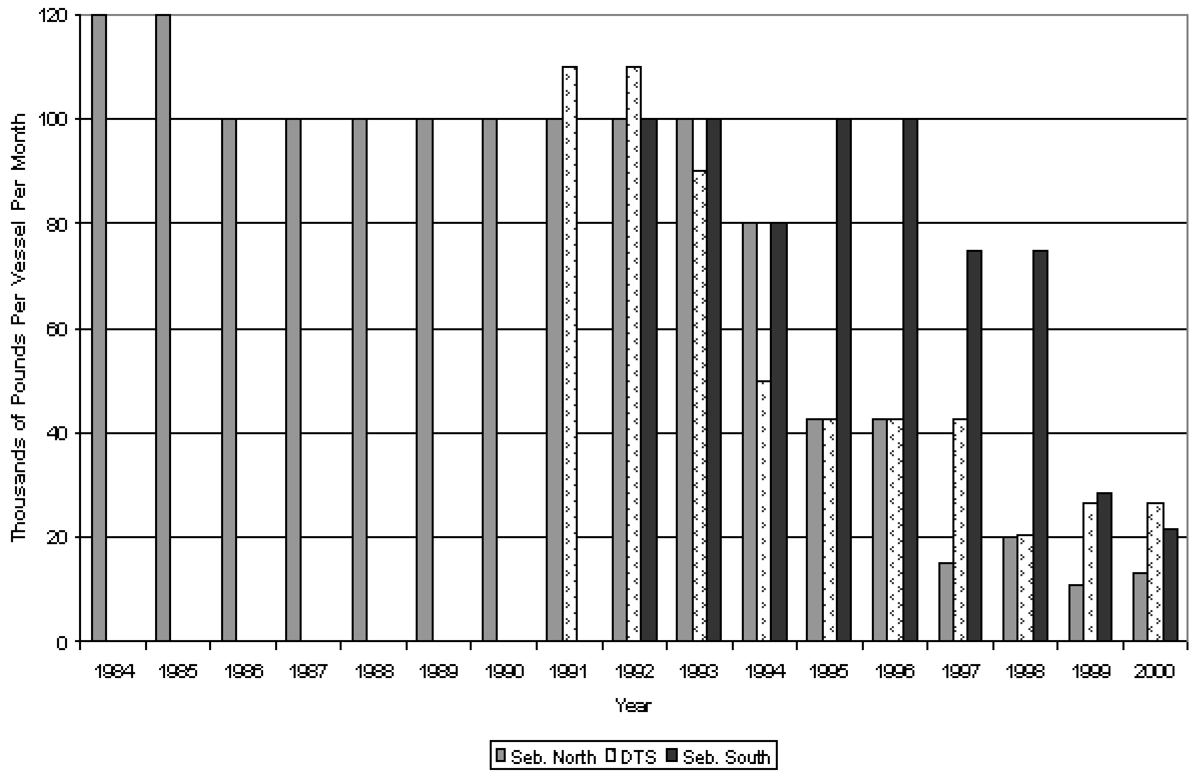
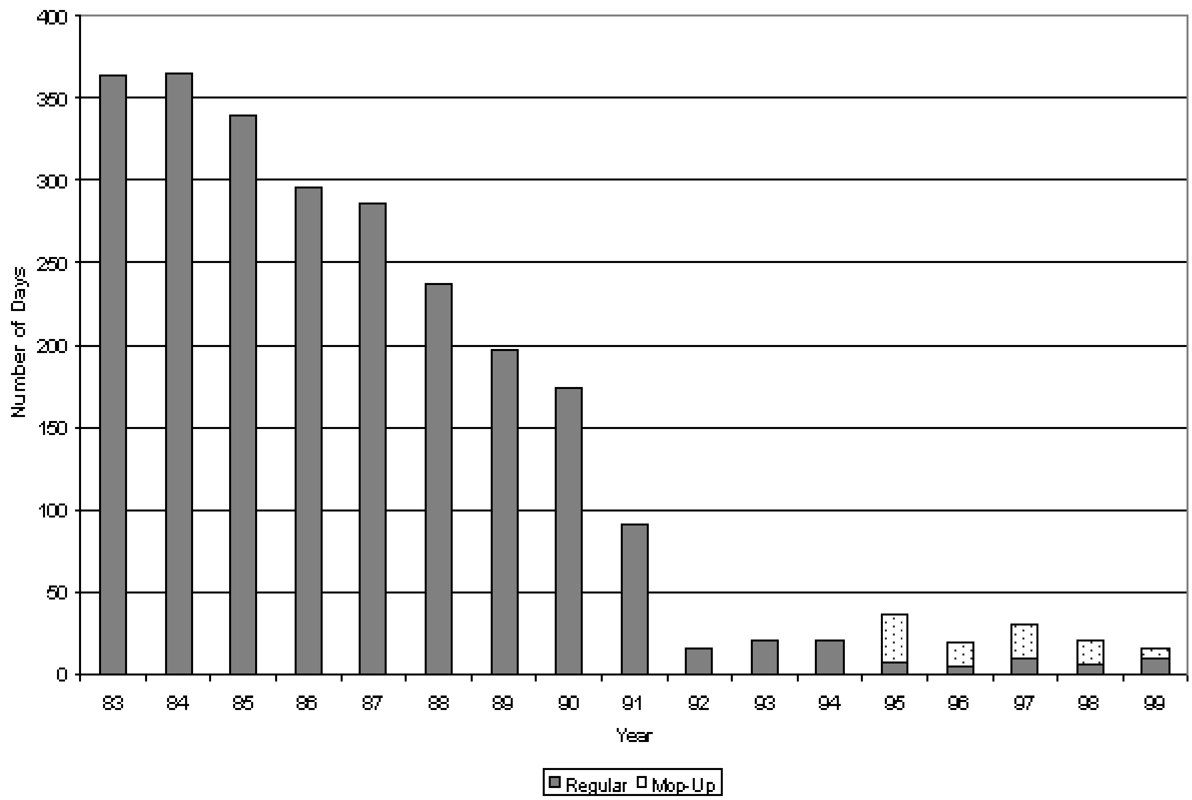


FIGURE II-23. Length of Limited Entry Fixed Gear Sablefish Season, by Year



III. A REVIEW OF CAPACITY REDUCTION PROGRAMS WORLDWIDE

III.A. Introduction

Overcapitalization and excess capacity are paramount problems for many of the world's fisheries, generating significant economic, biological, and social costs. On a global scale, existing capacity may exceed by a factor of three or four the capacity necessary for sustainable harvests.[17] In order to reduce overexploitation, the National Academy of Sciences' National Resource Council (NRC) report on Sustaining Marine Fisheries recommends that management target the elimination of overcapacity as its highest priority (NRC 1999b). Although there are many contributing factors, the fundamental cause of overcapacity is institutional failure: the inability of management to craft regulatory systems capable of "rationally" controlling capacity.[18] Recognizing the severity of the problem, FAO's Code of Conduct for Responsible Fisheries (adopted by the U.S. in 1996) recommends that "management develop plans that ensures that fishing effort is commensurate with the productive capacity of fishery resources and their sustainable utilization." Addressing this recommendation, however, requires that managers determine (1) the "productive capacity of the resource", (2) requirements for "sustainable utilization", and (3) explicit definitions of "productive capacity", "sustainable" and "excess capacity". These determinations are a difficult but necessary first step for developing plans capable of achieving clearly articulated goals, particularly goals related to managing capacity.

The need to reduce excess capacity in U.S. fisheries is addressed by the 1996 Sustainable Fisheries Act (SFA). Under SFA provisions, the Secretary of Commerce can fund capacity reduction programs (vessel buyout, license retirement, gear retirement) through various mechanisms, including an industry fee system. Such fee systems have been proposed for the West Coast groundfish limited entry trawl and Alaska crab fisheries.[19] Plan implementation has been stalled by a number of factors, including the slow pace of federal bureaucratic review and various equity, allocation, and resource-based issues. Other mechanisms in the SFA can also help address capacity problems. For instance, Section 312(a) authorizes the Secretary to contribute up to 75% of the costs to address natural or uncontrollable disasters, including measures to reduce capacity and compensate vessels owners and crew.

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[17] The National Research Council's (NRC) 1999 report on "Sustaining Marine Fisheries" and the OECD report on the economic aspects of managing marine resources (1997) cite a number of analyses which concur that worldwide, fisheries are overcapitalized by 300%-400% .

[18] "Rational" management is defined as a systematic management program capable of achieving clearly defined management objectives.

[19] See proposals by (1) Leipzig and Young (1997) describing the West Coast groundfish limited entry trawl permit buyback program, and (2) the Capacity Reduction And Buyback Group (CRAB) (1998) for purchasing licenses in the crab fisheries of the Bering Sea/Aleutian Islands.

Many programs have made efforts to reduce excess capacity and improve economic efficiency. A review of these programs demonstrates that management strategies for reducing capacity fall into roughly four categories: (1) buyouts of licenses or effort funded by government and/or industry; (2) incentive-based strategies, including taxes, fees and rights-based markets for quota, effort, or permits; (3) elimination of subsidies or other economic or socially "perverse" incentives supporting "excess" capacity; and (4) status quo or "do nothing" approaches which ultimately result in effort exiting the fishery due to decreasing stocks and negative profits. In many cases, capacity reduction programs contain elements from all four of these approaches.

Although a complete review of each of the four major capacity reduction approaches is beyond the scope of this report, a variety of programs that exemplify each approach and the strategic elements and impacts of these programs are highlighted. The following section describes these programs in terms of: (1) their primary goals and strategies, (2) sources and methods of program funding, (3) short and long term effects, and (4) fundamental lessons and principles applicable to West Coast groundfish fisheries.

III.B. Capacity Reduction Programs

Many efforts have been undertaken to reduce "excess" fishing capacity worldwide, particularly in response to economic crisis or low resource stock size. Most of these programs have occurred in developed nations, including Canada, the United States, Norway, Iceland, New Zealand and Australia. Several reviews of capacity reduction programs – particularly programs based on government and/or industry buyouts -- have been conducted (Gates *et al.* 1996; Read and Buck 1997; GAO 1999; Poulsen 1999). Analyses have also been conducted of rights based market strategies and their impact on capacity reduction (ICES 1997; OECD 1997). The most detailed of these evaluations have summarized the design elements and success of these programs in achieving their objectives. Although limited by incomplete data, the evaluations have nevertheless provided a number of useful findings.

Government or industry funded buyout programs are the most common approach to reducing excess fishing capacity. At least thirty programs have been summarized and reviewed in recent literature. Although in some cases industry has committed substantial dollars, in most cases buyouts are funded primarily by the government. Government involvement is usually justified on the basis of humanitarian grounds or the failure of public managers to achieve management objectives. In many cases, government buyout programs are part of emergency relief efforts to help industry and fishing communities weather the financial crisis associated with overfishing and/or stock collapse. The cost of these programs has ranged from less than $1 million to over $500 million (Gates *et al.* 1996; GAO 1999).

III.B.1 Program Goals

Most capacity reduction programs are designed to achieve one or more of the following goals:

1. Improve resource conservation.
2. Generate greater economic benefits.
3. Serve as a conduit for transferring payments from one sector of society to another.

The conservation goal is linked to the assumption that reductions in fleet size will also reduce political pressure to maintain high harvest rates. The economic goal is linked to the expectation that the withdrawal of capacity from a fishery will improve overall fleet profitability by making more fish available for remaining capacity. The financial assistance goal is linked to a desire to help the industry survive until conditions improve or make a transition out of the fishery.

The following are examples of objectives specified for a variety of capacity reduction programs.

1. Economic objectives
    a. Reduce maximum capacity at the least cost (Atlantic Canada groundfish)
    b. Provide higher and more stable income to fishers/industry (Atlantic Canada lobster)
2. General capacity objectives
    a. Reduce overall fleet size (British Columbia salmon)
    b. Reduce fishing capacity (West Coast salmon)
3. Specific capacity objectives
    a. Reduce demersal fisheries capacity by 20%, benthic capacity by 15%, pelagic capacity by 0% (European Union)
    b. Reduce fleet by 17% gross tonnage and 15% horsepower (United Kingdom)
    c. Eliminate 16,000 gross tons while upgrading remaining fleet (Denmark)

Economic and physical capacity objectives are often stated generally; in many cases, they are secondary to the primary goal of providing financial relief to the industry. Objectives that are too general are not useful for structuring a capacity reduction program or measuring its effectiveness. Even specific objectives that set measurable targets may not achieve significant long run economic benefits if they fail to address the underlying causes of excess capacity.

III.B.2. Program Strategies

This section discusses strategies associated with the four categories of capacity reduction programs outlined in Section III.A above and provides brief examples of each from capacity reduction programs worldwide.

III.B.2.a. Buyout Strategies: Government Sponsored

Government sponsored buyouts are the most common form of capacity reduction program. Ten U.S. programs have been implemented since 1976: five for Pacific Northwest salmon, two for New England groundfish, and one each for Texas shrimp, Glacier Bay Dungeness crab and Bering Sea groundfish (a mixture of government backed loans and grants).[20] To date, $160.0 million has been spent on buyouts, including $80.3 million in federal grants and $75.0 million in federal loans. As a result of these buyouts, 2,907 permits have been purchased and 597 vessels either scrapped or barred from fishery participation. Average cost per license, or license plus vessel, has approximated $10,000 for salmon and small vessel fleets, $250,000 for mid-sized trawlers, and $10 million for factory trawlers. Administrative costs have ranged from .2% to 12% of total program costs.

Government sponsored buyout programs are structured in a variety of ways, depending on legal and regulatory constraints, program objectives and program funding. Most programs rely on an auction system to determine the selling price for permits or vessels; other programs offer a flat fee or "take it or leave it" price for a vessel or license. Some programs focus on short term retirement of capacity in the targeted fishery, while others are designed so that all elements of capacity -- including physical capital (vessel and gear) and human capital (owners, skippers and crew) -- are removed from the target fishery and are kept from leaking into other fisheries. In some cases, bidding rules are designed to favor retirement of capacity least likely to spill over into other fisheries. In the most extreme cases, the vessel and gear are purchased and scrapped, the permit purchased and retired, and the vessel owner required to sell or retire all other fishing permits.[21] In addition, the vessel owner or skipper/crew may be permanently banned from re-entering either the targeted fishery or other regional or national fisheries.

III.B.2.b. Buyout Strategies: Industry Co-Sponsored

Few buyout programs are completely sponsored by industry because most limited entry fisheries are managed on the basis of government-bestowed privileges and weak property rights. The insecure status of these rights, combined with other risks, results in significant private market loan premiums far exceeding the financial ability of most fishing industries, particularly industries that are unprofitable and overcapitalized.

Co-sponsored programs usually combine direct government financing with industry contributions generated through increased license fees, increased landing taxes or government guaranteed low interest loans. Because it may be financially or politically difficult to collect

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[20] The recent GAO report (1999) on U.S. federally funded buyout programs summarizes program results and costs.

[21] Europe in particular has designed capacity reduction programs in attempts to minimize spillovers into adjacent fisheries. See Hatcher and Robinson (1999) for examples.

significant fees from a highly overcapitalized fishery, the government typically uses public funds to buy out some proportion of capacity, then levies a license fee or landings tax (usually 1%-5% of ex-vessel revenue) on remaining vessels or permit owners. Government agencies acting as lenders must be convinced that loan programs will produce a return that justifies the investment and enables loan repayment.[22] The government usually manages the funds, which are used to either repay the loan or to buy out additional capacity from the fishery over time. To date, U.S. buyout programs have applied to at-sea catcher-processor vessels and permits in the Bering Sea/Aleutian Islands crab ($45-$60 million), Pacific salmon ($32 million), Atlantic swordfish ($18-$20 million), Atlantic scallop ($40-$60 million), Atlantic shark ($12-$50 million) and Pacific groundfish ($10-$30 million).

III.B.2.c. Long Term Incentive Strategies: Rights-Based Quotas

In contrast to many government and industry co-sponsored buyout programs, rights based systems rely on market incentives to adjust capacity. Probably the best known rights based system is the Individual Fishery Quota (IFQ). When IFQs are transferable, quota markets allow capacity to adjust to changing resource, market and technological conditions. Less efficient producers can gain more by selling their quota shares than by using them to fish, so will sell their quota shares to more efficient producers. Regulatory intervention is not required to adjust capacity to its economically efficient level. Because transferable IFQs can endow the initial recipients of quota share with considerable wealth, some governments require that at least some portion of the research and management cost be recovered from industry.[23]

About 65 to 75 IFQ programs exist worldwide. These programs vary in terms of goals, objectives and strategies. Programs with goals weighted toward efficiency have relatively few controls (e.g., New Zealand). In contrast, programs designed to protect jobs, family owned firms or geographic distribution of income (NRC 1999a) tend to include detailed controls (e.g., Alaska halibut).

Although many IFQ systems allocate quota to individuals, in some cases quota is allocated to communities or industry user groups (NRC 1999a). These programs have widely varying goals and designs. In some cases quota can be allocated and traded within the group; in other cases quota is managed through a corporate or cooperative organization.

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[22] Rollie Schmitten, Assistant Administrator for U.S. Fisheries, raised a number of these concerns in a January 1998 letter to Jerry Mallet, PFMC Chair, regarding a proposed industry funded buyout program for the Pacific groundfish limited entry trawl fishery.

[23] The National Research Council's recent report on IFQs (1999a) offers some discussion of cost recovery programs.

III.B.2.d. Incentive Strategies: Licenses and Permits

Many fisheries use licenses and permits to limit fishery participation. These permitting systems may be relatively simple or complex, depending on their objectives and design. Unless accompanied by input controls (e.g., restrictions on gear or fishing power) or output controls (e.g., trip limits, IFQs), licenses or permits are incapable of controlling effort. The reason is "capital stuffing", whereby the industry increases those elements of capacity not controlled by the program in order to increase the effectiveness of fishing effort and win the race for fish. Similarly, strategies such as permit stacking can reduce capacity only if management also includes complementary input or output controls. One example of this technique occurs in British Columbia, where salmon license owners are required to stack licenses in order to fish in different geographical areas (Muse 1999).

III.B.2.e. Incentive Strategies: Effort Based Quotas

Some capacity reduction programs are based on transferable effort quotas. One example is the Florida spiny lobster trap certificate program (Milon *et al.* 1999). Under this program, the state of Florida reduced capacity and increased catch per unit effort by instituting a tradable pot program while also mandating percentage-based trap reductions for the entire fleet. The program reduced the number of traps by approximately 50% and increased the value of remaining traps by 100%-400%. A second example of transferable effort quota programs is in the Australian gillnet baramundi fishery. The program mandated a significant reduction in total linear feet of gillnets while allowing the remaining linear feet of gillnet to be traded among permit holders (Gates *et al.* 1996).

III.B.2.e. Incentive Strategies: Taxes or Fees

Governments have instituted taxes on landings and/or fees on permits in order to recoup the cost of government funded buyouts or to recover research and management costs. Taxes and fees can also be used to limit the number of active participants and compel active participants to minimize their costs.[24] They also provide a mechanism for government to collect fishery royalties or rents. A few fisheries have instituted relatively high fees after government supported buyouts which not only helped pay back the cost of the buyout but effectively limited the number of fishermen who renewed their license (e.g., British Columbia salmon). However, because high taxes and fees are politically unpopular, they are rarely used as an incentive system to manage fisheries.

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[24] See FAO Technical Working Group (1998) report for a discussion regarding use of taxes or fees for fisheries management.

III.B.2.f. Removing Subsidies

Worldwide, approximately U.S. $10-$40 billion is spent annually to subsidize fisheries that generate approximately U.S. $160-$200 billion in revenue (NRC 1999b). These subsidies are a component of the total costs of fisheries, which exceed revenues by an estimated U.S. $60 billion annually. Approximately 30-40 subsidy programs have been implemented in the U.S. fishing industry (Federal Fisheries Investment Task Force 1999). The two most important U.S. programs are the Capital Construction Fund and the Vessel Loan Guarantee Fund. These two programs are believed by many to have contributed to overcapitalization and overcapacity in U.S. fisheries. However, not all support eliminating subsidies, particularly programs which are an important component of fishing operations and investments. This difference was highlighted by the Federal Fisheries Investment Task Force report (Federal Fisheries Investment Task Force 1999). While the Task Force was able to reach consensus on most findings, it was unable to reach strong consensus on the need to eliminate the Capital Construction Fund. A weak majority of panelists believed that the Fund should be eliminated but rolled-over into tax deferred investments; a strong minority argued that the Fund is necessary for rebuilding aging and technically obsolescent fleets.

III.B.2.g. Mixed Strategies

Many capacity reduction programs incorporate mixed strategies. One common approach is to combine a one-time voluntary government funded buyout with an incentive-based capacity management program like IFQs. In some cases the government may follow a one-time voluntary buyout with subsequent measures requiring additional mandatory retirement of capacity or effort.

III.C. Lessons from Existing Capacity Reduction Programs

The following section briefly describes lessons learned from existing approaches to capacity reduction and management. Very few programs, including buyouts and rights based approaches, have been subject to rigorous quantitative evaluation of long term effectiveness in achieving objectives. Most of the following discussion is based on qualitative reviews and assessments.

III.C.1. Buyout Strategies: Government Sponsored

Worldwide, at least 25 government sponsored fishery buyout programs have been implemented during the past twenty years (Gates *et al.* 1996; Read and Buck 1997). Although these programs vary significantly in detail, all were designed to reduce capacity and achieve some or all of the objectives summarized in Section III.B.1. These programs removed 3% to 40% of active licenses, and averaged 20%. In approximately half these cases, vessels were also purchased, scrapped or retired from the targeted fishery. However, given long run problems associated with technological innovation, re-entry of “highliners” and the transformation of latent to active capacity, long run successful capacity removal is estimated to be significantly less than 20%. Because the fisheries in which these programs were implemented were heavily overcapitalized, an additional 40%-80% reduction in capacity would probably have been required to achieve maximum economic benefits.

A few programs, however, have successfully reduced capacity. For example, 18% of tonnage was successfully retired from the Norwegian purse seine fleet in 1986 (Hannesson 1986). Due to previous government efforts, little latent capacity existed in the fishery and only active permits and vessels were purchased. The resource stocks were also in reasonably healthy condition. The buyout was deemed to have generated positive net economic benefits exceeding the costs of the program.

Government sponsored buyout programs are often instituted when the industry is highly overcapitalized and experiencing severe financial hardship and resource depletions. Under these conditions, the primary objective of a government sponsored buyout is to relieve the short term financial crisis by transferring public dollars to industry and coastal communities rather that address the longer term "root" cause of the capacity problem. In fact, few government sponsored buyout programs require that fishery regulators resolve the conditions that created the capacity problem, which then remain a factor in limiting the effectiveness of capacity reductions.

Government sponsored buyouts in the form of grants tend to inflate the value of permits and vessels above private market prices if the value of the grant becomes capitalized in the value of the permit. Prices may be further inflated if expectations exist that future grants will be forthcoming; speculation primes the value of the fishery. Such expectations, whether realized or not, increase the market value of permits and vessels and therefore the cost of capacity reduction. However, while this is recognized as a potential problem, it has not been documented in empirical studies. Depending on the significance of this problem, the cost-effectiveness of government grants will be reduced. Other uses of government funds (e.g., for retraining or unemployment compensation) may also be capitalized in the value of permits, though perhaps to a lesser extent than if used directly to finance a buyout.

III.C.2. Buyout Strategies: Industry Co-Sponsored

Few analyses have been conducted of the costs and benefits of buyout programs co-sponsored by industry and government. When buyouts are primarily sponsored by industry, improved long-term economic performance becomes a more important objective than providing temporary financial relief. Loan programs co-sponsored by industry are also expected to have greater conservation impacts due to the significant reduction in participants, increased profitability and the longer term increase in the capitalized value of remaining permits.

A few industry supported buyout programs have been conducted in other countries, for instance, the South Australian rock lobster and northern prawn fisheries (Gates *et al.* 1996; Poulsen 1999). In the lobster fishery, the industry purchased 40 licenses but found that, due to decreases in lobster prices and capital stuffing, they had a difficult time repaying the loans. In the prawn fishery, the buyout failed to generate sufficient capacity reduction, and the government was compelled to mandate a 30% surrender of each vessel's "capacity units", measured by horsepower and hold size. Remaining vessels were required to purchase remaining units from retiring vessels. The number of vessels in the fishery fell dramatically from 302 to 137, and today loans are being successfully repaid. However, some felt the program was inequitable because many small vessels could not afford to fund the loan and also purchase additional capacity units.

These examples demonstrate some of the risks inherent in an industry sponsored buyout program.[25] To some extent, these risks can be ameliorated by adopting bidding rules that allow purchases to be canceled if enough capacity is not removed from the fishery. There is an additional risk that loans will not be repaid due to uncertainties about fishery regulations and access to fishery resources and markets. To reduce these risks, the loan guarantor, usually the federal or state government, is expected to require fiscally conservative plans and develop predictable regulatory rules -- for example, guaranteeing fixed resource allocations. Government must also recognize that it can distort private and public decision making if, for example, industry believes that it can incur fewer costs by defaulting on a government guaranteed loan than by defaulting on a private bank loan. This possibility highlights the importance of government proceeding in a manner that is cautious, fiscally conservative and fair.

III.C.3. Incentive Strategies: Rights-Based Quotas

IFQs are relatively new forms of fisheries management, and few quantitative evaluations exist regarding their impact in reducing and managing capacity. Most evidence suggests that IFQ programs have reduced capacity significantly, in some cases more than 80% (NRC 1999a). However, a more precise determination of IFQ impacts on capacity, conservation and economic efficiency is difficult because they are relatively new, have multiple designs, and are implemented in different economic and resource contexts. Some evidence suggests that, while rights based quota programs may reduce capacity, they may not reduce it rapidly (FAO Technical Working Group 1998). In some programs, significant capacity reduction may take 5-10 years, depending on how initial allocations and transfer rules are designed. Programs designed primarily to achieve economic efficiency and maximize quota value can be expected to more rapidly reduce excess capacity to economically efficient levels. In contrast, programs designed to achieve other social objectives, such as maintaining distribution of quota share over different groups, are less directed at achieving economic efficiency. However, even in cases where social objectives are important (e.g., North Pacific halibut IFQs), there is evidence that excess capacity has been reduced and effort made more efficient across space and time.

Government or industry buyouts may reduce capacity at much faster rates than rights based management. The advantage of a transferable rights based program is its ability to manage capacity over the long term by letting the market provide signals to quota holders regarding how

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[25] Hastie (1998) analyzed some of the risks inherent in conducting an industry sponsored buyout for the West Coast groundfish limited entry trawl fishery, including uncertainties regarding allowable harvest levels and numbers of remaining permits.

to adjust capacity in response to changing technological, market and resource conditions. This advantage stands in sharp contrast to management systems that rely on regulations to manage capacity. The fewer restrictions placed on transferability, the more this advantage is likely to be realized. Transferability also has the potential to generate significant economic rents that are capitalized in the value of quota shares. These rents can be taxed as a source of revenue to the public or to recover the costs of research and management. As a cost to industry, these taxes can act as an additional incentive to eliminate inefficiencies and reduce excess effort.

Little detailed information exists on the capacity reducing effects of programs in which industry or community groups own quota shares. Recent reports on the Pacific whiting and Alaska pollock cooperatives suggest that the cooperative approach has significantly reduced active effort, but not necessarily latent capacity. These programs have eliminated the race for fish and reduced the number of vessels active in the fishery (NRC 1999a). The reduction in capacity in the coop fisheries, however, has reportedly resulted in significant leakage of effort to other West Coast groundfish fisheries.

III.C.4. Incentive Strategies: Licenses and Permits

Controls on the number of licenses and permits can reduce capacity fairly rapidly. However, unless the race for fish is also eliminated, their long term effectiveness can be compromised because of capital stuffing. Output controls such as trip limits are sometimes used in conjunction with licenses/permits to discourage capital stuffing. The potential for capital stuffing is common to all capacity reduction approaches that regulate one or several dimensions of capacity while leaving other dimensions unrestricted.

License stacking (multiple purchase of licenses by a single owner) when licenses are associated with some proportion of the total quota is similar to an IFQ. However, while license stacking may have some potential to control capacity, it may be inflexible over the long term due to difficulties in disaggregating quota share associated with the license.

III.C.5. Incentive Strategies: Effort Based Quotas

In three fisheries where effort based quotas have been applied (Florida spiny lobster fishery, Western Australia lobster and baramundi fisheries), they have succeeded in reducing and managing capacity, increasing profitability and sustaining the resource. All three programs occur in relatively homogeneous single-species fisheries based on pot or gillnet technologies. In each program, capacity was reduced by first requiring each permit holder to eliminate some proportion of effort, then instituting markets for trading units of remaining effort (pots or linear feet of gillnets). Whether these systems can successfully maintain capacity reductions over the long term will depend on management’s ability to successfully thwart industry’s attempts to increase the effectiveness of their gear.

III.C.6. Incentive Strategies: Taxes or Fees

Taxes and fees can be used to recoup management costs, transfer rents to the public treasury, and control effort. High taxes or fees, however, are rarely used in fisheries because they are politically unpopular. Some economists argue that taxes can help manage fisheries more efficiently than quota share programs, particularly where stock size is uncertain (FAO Technical Working Grouping 1998). It is unclear, however, how optimal tax rates can be calculated when they generate an uncertain response by industry in reducing costs, improving technology and increasing output market value.

III.C.7. Removing Subsidies

Although subsidies may help fishery participants in the short term, in the long term they often act as perverse incentives and encourage excess capacity and economic inefficiencies. This is true for the Capital Construction Fund and the Loan Guarantee Fund. Once instituted, subsidies are difficult to eliminate because industry depends upon them as essential elements in their business operations and planning. In some cases, subsidies may be useful for achieving certain fishery objectives or to support fishery research. A scheduled phase-out of industry subsidies, combined with deferred tax payments, may be a reasonable and equitable approach.

III.C.8. Mixed Strategies

Many capacity reduction programs have used mixed strategies, including buyouts, mandatory retirements and incentive programs. In a number of cases these programs were instituted in discrete phases. In the first phase, buyouts or mandatory retirement programs were instituted in order to rapidly reduce capacity in overcapitalized fisheries and provide financial disaster relief. In the second phase, incentive-based market systems were implemented in order to increase economic efficiency. In some cases, a third phase may have also been instituted in order to transition to more effective incentive systems. Although a phased strategy may not always be the best approach for reducing capacity, it may provide some advantages including increasing the possibility for reaching consensus decisions, allowing for transition strategies to prepare for the next phase, and providing opportunities for adaptation and learning.

III.D. Fundamental Issues and Relevance to West Coast Groundfish Fisheries

This section highlights some lessons from capacity programs worldwide that are particularly relevant to the West Coast groundfish fishery. The review of fishery capacity reduction programs demonstrates that capacity reduction and management is a complex challenge, with many issues influencing success or failure.

Most Critical Lessons

- ***"Optimal capacity" should be defined in reference to specific management goals and objectives.***

  The optimal amount of capacity depends on management objectives. Managing to achieve economic efficiency may result in an optimal capacity and fleet configuration quite different from an objective of sustaining geographically diverse fishing communities. The fundamental question for capacity reduction is which program most effectively achieves the management objectives. Since fisheries are dynamic, the optimal level of capacity is also dynamic and will change and evolve over time.
  Optimal capacity can also be defined on different scales -- for example, a targeted species, a species mix, an ecosystem or a region. Capacity that is considered optimal on one scale may not be optimal on another. Trying to control capacity at a fixed level is an elusive goal. The more appropriate capacity management objective is to design a program that allows adjustments consistent with other fishery objectives. Capacity reduction and management objectives for West Coast groundfish will need to address not only the objectives of the Groundfish FMP but also those reflected in the SFA. Capacity management programs that address broader fishery issues such as discards, allocation, essential fish habitat, and stabilizing coastal communities will have a greater chance of being supported and funded.

- ***Capacity reduction and management programs must be skillfully designed and implemented in order to achieve short and long run management objectives.***

  There are many ways to reduce and manage capacity. In order to craft the best combination of strategies and actions, short and long term objectives must be explicitly defined. Program objectives, fishery characteristics and resource constraints will dictate the specific combination. Lessons from fishery experience worldwide are that managers must ensure that they:

  - carefully define management goals for the fishery,
  - define specific objectives that will lead to the achievement of goals,
  - design a cost-effective program that will meet the objectives,
  - adequately fund the program, and
  - monitor and evaluate progress toward meeting program goals and objectives.

  Failure to follow these steps may be the reason so many government buyouts have been less effective than intended.

- ***Designing and implementing an incentive-based system for "managing" capacity is the paramount long run challenge.***

  Capacity reduction strategies are a subset of capacity management strategies. Capacity reduction may not ensure future optimal levels of capacity. Because capacity is a complex and dynamic concept influenced by evolving and rapidly changing resource and market conditions, it cannot be micro-managed through a bureaucratic or political process. Incentive based management systems are necessary to allow industry to efficiently adjust capacity to evolving conditions. Designing incentive systems that achieve these long term adjustments is the paramount challenge.

Other Important Lessons

- ***"Target-based capacity reduction" is a fundamentally different approach than "maximizing capacity reduction given available budget".***

  Most capacity reduction programs involve one of two basic approaches: (1) eliminating the greatest amount of capacity given the available budget ("biggest bang for the buck"), or (2) achieving a "target capacity" regardless of the available budget. As this review has demonstrated, most government sponsored buyouts are structured around the first strategy. In contrast, industry sponsored programs focus on the second strategy because, if the target is not achieved, those remaining in the fishery will be incapable of earning sustained profits. A focus on the target is important for ensuring that the range and mix of potential strategies is appropriate to the target.

- ***"Capacity" is also defined by its human dimensions.***

  Capacity is composed of human as well as physical capital. A focus on technical or physical measurement will miss the importance of human capital and may result in poor planning and predictions of capacity adjustment. For example, poorly managed fisheries may attract a different set of owners, skippers and crew than well managed fisheries. As management changes, new human capital may create, select and use physical capital in new and innovative ways. Ignoring this vital dimension can result in implementing an inappropriate management approach, or poorly predicting its consequences.

- ***Socioeconomic information on West Coast groundfish fisheries will help managers design cost-effective capacity reduction programs and evaluate their performance.***

  Given the magnitude of excess capacity in West Coast groundfish fisheries, resolution of this problem should not be delayed while additional data are collected. However additional social and economic information on vessel operations, fleets and communities will enhance the ability of managers to adjust program design to improve cost-effectiveness and evaluate performance.

- ***A number of relatively successful capacity reduction and management programs have used multiple and phased strategies to reduce and manage capacity.***

  Some programs have used a mix of strategies, such as combining initial capacity reduction strategies (e.g., grant and loan supported buyouts, mandated reductions) with long run effort or quota based market incentive systems. A comprehensive capacity program would combine short run capacity reduction and long run capacity management in a single package. Grants could be made contingent on the development of long term capacity management programs capable of achieving targets consistent with fisheries management objectives. Programs could incorporate transition periods between major program elements.

- ***Capacity spillover into adjacent fisheries may be a problem, depending on whether capacity in these adjacent fisheries is already subject to rational management.***

  Reducing and managing capacity in one fishery may have significant spillover effects in adjacent fisheries if those fisheries are without effective access control. Managers should be aware of the potential for this problem in the program design phase and take steps wherever possible to protect other fisheries from unintended spillovers.

- ***Buyouts funded by industry have been more successful at producing significant reductions in capacity than programs funded by government alone.***

  Loan programs with at least partial industry funding have been more successful at reducing capacity than those funded by government, since industry will not support a buyout program and the associated management adjustments unless they are expected to result in a profitable fishery. Actual or proposed government funded buyouts can result in inflated permit and vessel values, increase speculation and actually encourage increases in industry capacity and/or effort by those who want to qualify for the next buyout. Government buyout programs have rarely required that management address the fundamental problems causing overcapacity. Management change may not even be considered if the overcapacity problem is defined as a "natural" (rather than man made) disaster.

- ***The bid offers obtained in capacity buyout programs reflect bidding system design, the current situation and future expectations.***

  The level of bid reflects both the design of the bidding system and the discounted stream of expected net benefits associated with retaining a permit and/or vessel. Since government supported buyouts, and to a lesser degree government backed loans, are a form of subsidy, these subsidies (and expectations of future subsidies) will become capitalized into the bid prices. The larger the government grant, the more valuable individual permits become and the more expensive it will be to buy out those permits.

The "availability" or effectiveness of the subsidy will depend to some degree on how bidding rules are crafted (e.g., whether the permit purchase price is capped).

Bid prices also reflect expectations about future management. If, for example, industry expects management to develop in the near future in a way that will lead to more stable or more efficient fishery operations, this would also increase the value of the permits. The paradox is that the greater the commitment to solving the capacity problem and improving management, the greater the present and future value of the fishery and, therefore, the higher the bid price.

Bidding systems should be designed to reflect buyout objectives. For example, if minimizing spillovers into other fisheries is an objective, the bid system should promote this outcome. The trade-offs associated with alternative bidding systems (e.g., retiring fewer vessels from all fisheries versus retiring more vessels from the targeted fishery) should be carefully evaluated before selecting the system that best meets overall needs and achieves political consensus.

III.E. Conclusions

Reducing fishing capacity consistent with resource productivity and management objectives is a paramount challenge for world fisheries. Potential solutions include buyouts, mandatory retirement and rights-based management. This review of capacity reduction demonstrates that programs primarily focused on providing short term financial assistance rarely reduce capacity enough to significantly enhance industry profitability or resource conservation. Fundamental problems remain unaddressed. In contrast, programs designed to reduce capacity while improving industry profitability are more successful. These programs often use mixed strategies including loan programs, mandatory capacity retirement or consolidation, and market-based incentives. Their focus broadens beyond short term capacity reduction to encompass longer term capacity management.

This review strongly supports the proposition that the fundamental cause of overcapacity is the failure of management to craft regulatory systems capable of rational capacity management. Initial capacity reduction strategies (e.g., buyouts, mandated reductions) provide a first step. The second step is to address the fundamental cause, which requires that managers end the race for fish and provide incentives for industry to adjust capacity in response to changes in technology, markets and the resource.

As programs worldwide demonstrate, the most significant challenge to solving capacity problems is marshaling the political will to implement programs that offer both short term and long term solutions. For West Coast groundfish, finding political common ground will be difficult, given the linkage of the capacity problem to other issues, including harvest allocations, bycatch and community sustainability. Success in reducing capacity will depend on the ability of managers, politicians and industry leaders to address a range of related problems. The strategies discussed in this section provides some tools for developing workable solutions.

IV. CAPACITY REDUCTION APPROACHES FOR WEST COAST GROUNDFISH

IV.A. Introduction

This section provides a strategic analysis of how harvest capacity reduction can be accomplished in the West Coast groundfish fishery. Neither the time nor the resources were available to conduct an exhaustive analysis of all possible methods of reducing capacity, nor are specific plans proposed for implementing any single alternative. Nevertheless, sufficient information is available to draw some implications regarding what will happen if capacity is not reduced, and to define the major issues that will be associated with some prominent methods of reducing capacity.

The strategic analysis was conducted as follows:

1. Characteristics of West Coast groundfish fisheries relevant to overcapacity were identified.

2. Groundfish management goals were examined, and criteria identified to evaluate the potential of capacity reduction to achieve these goals.

3. Alternative capacity reduction approaches were discussed in terms of their potential for meeting the evaluation criteria.

4. Conclusions and recommendations were made regarding the nature of the overcapacity problem, the likely outcomes associated with alternative approaches to reducing capacity, and alternative transitions to where the Council might want the fishery to be in the future.

IV.B. Factors Relevant to Evaluating Extent of and Effects of Overcapitalization

The West Coast groundfish fishery is characterized by a number of uncertainties that complicate the problem of defining the extent of the overcapacity problem and evaluating alternative solutions to the problem.

<u>Adaptation/diversification:</u> West Coast fishing vessels have always participated in multiple fisheries as a way to increase profits and diversify their fishing "portfolio" in order to reduce the risk of a poor season in any individual fishery. For instance, some groundfish vessels diversify by utilizing several different fishing gears or fishing strategies to target different species complexes within the groundfish fishery; diversification can also take the form of participation in non-groundfish fisheries. This type of behavior is a function of the economic opportunities available in one fishery relative to another and is by no means unique to groundfish. For instance, just as current difficulties in the groundfish fishery have prompted some boats to increase their participation in

non-groundfish fisheries, the groundfish fishery has also been impacted by developments in other fisheries (e.g., IFQs in the Alaska sablefish fishery, decline of the West Coast salmon fishery, periodic bad years in the West Coast shrimp fishery). The ability of West Coast fishermen to diversify their operations has declined in recent years, as an increasing number of fisheries have reverted to limited entry and an increasing number of fish stocks have become fully if not over-subscribed. Nevertheless, adaptation/diversification remains a well-used strategy in fisheries for enhancing financial returns, stabilizing income and reducing risk.

Future groundfish fishery and market conditions: Uncertainties exist regarding the future abundance of groundfish stocks and future groundfish harvest policy, both of which have a significant bearing on future groundfish OYs. Since overcapitalization is measured by the difference between potential harvest capacity and OYs, uncertainties regarding future OYs complicate the ability to predict the extent to which overcapitalization is likely to increase or decrease over time. Groundfish prices are also relevant to predicting the effects of capital reduction, as they can either mitigate or exacerbate the economic effects of capacity reduction on the industry.

Future non-groundfish fishery and market conditions: Management, markets and prices in non-groundfish fisheries such as shrimp, albacore, Dungeness crab and sardine will have a significant bearing on the ability of groundfish participants to adapt to low groundfish OYs. These conditions will also affect the ability of non-groundfish fisheries to absorb the effort being diverted from the overcapitalized groundfish fishery.

Technological change: Improvements in technology increase the harvest capacity of individual vessels by enhancing the ability of fishermen to generate more catch. The rate of technological advance in electronics and fishing gear, estimated at 1%-5% annually (Gates *et al.* 1996), can significantly undermine the effectiveness of permit reduction programs in reducing excess capacity over the long term. For example, given a 2.5% rate of technological change, a 25% reduction in capacity could be absorbed (i.e., remaining capacity can harvest 25% more fish) in less than ten years.

IV.C. Alternative Approaches to Capacity Reduction

Because of the tendency of many West Coast fishing vessels to participate in multiple fisheries, overcapitalization will be best addressed by a coordinated approach that considers the harvest capacity requirements of all fisheries simultaneously. However, given the extent to which different fisheries fall under different management jurisdictions, such coordination will require lengthy and extensive data exchange and collaboration among the various management jurisdictions. While a comprehensive approach to capacity reduction may be a more beneficial and efficient way to manage fisheries, it is not likely to be achieved in time to address the immediate and pressing need for capacity reduction in the groundfish fishery. For this reason, the management approaches discussed in this section will focus largely on capacity reduction for groundfish only.

The capacity reduction approaches covered in this section include the status quo, limited entry (over and above the limited entry program already in place under the status quo), government and industry funded buyouts, voluntary and mandatory permit stacking and individual fishery quotas (IFQs).[26]

As indicated in Section IV.B, effects of capacity reduction are contingent on factors such as the ability of groundfish participants to diversify into other fisheries, future groundfish and non-groundfish fishery and market conditions, and technological change. The evaluation provided here does not dwell explicitly on the first two factors, since changes in either of these factors are not likely to affect the relative rankings of the different capacity reduction approaches. However, the third factor (technological change), which does affect the relative ranking of IFQs relative to the other capacity reduction approaches, is reflected in the discussion below.

IV.C.1. Status Quo

The status quo pertains not only to the current state of the fishery under the current management regime but also what will likely occur if the current regime is continued indefinitely into the future. Given current OYs, the status quo will likely result in more complex and costly management and enforcement. In order to prevent further declines in cumulative landings limits,

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[26] Some industry members have expressed interest in having the OYs allocated among industry cooperatives, who would then be responsible for allocating the available harvest among their individual members. One example of an industry-initiated group quota already operational in the groundfish fishery is the Pacific Whiting Conservation Cooperative, a small group of offshore whiting processing companies who have devised a "gentlemen's agreement" regarding the disposition of their share of the whiting allocation. The Whiting Cooperative possesses a number of features that tend to be conducive to the success of cooperative arrangements; that is, it involves a small number of homogeneous producers whose share of the OYs had already been established by decision of the Council. The SSC has little information regarding how cooperatives might be applied more broadly to other more heterogeneous sectors of the groundfish fishery, and is therefore unable to evaluate their potential as capacity reduction mechanisms. However, several issues were raised regarding the practicality of applying this approach across the spectrum of groundfish fisheries. For instance, cooperatives will require that the Council decide which groups are eligible to receive a portion of the OYs, and how to allocate the OYs among all eligible groups. Once the allocations are made, the Council and NMFS will likely have to provide some oversight to ensure that the actions of each cooperative are consistent with the requirements of the SFA and the Groundfish FMP. Monitoring and enforcement may be an issue as well, particularly if separate cooperatives establish separate rules for their members.

pressures will increase to terminate year-round fishing opportunities for all vessels, possibly through "platooning" (i.e., dividing the fleet into separate groups that are allowed to fish at alternative times of the year). As vessels are no longer given the opportunity to fish groundfish the entire year, participation in other fisheries can be expected to increase, with a consequent worsening of the spillover effect. Financial difficulties within the industry will cause allocation disputes to intensify, reduce safety as operators attempt to cut corners by postponing maintenance, and make it difficult for the industry to contribute to observer programs and other activities that are intended to improve management.

These problems will not be resolved by waiting for vessels to leave the fishery. Rebuilding currently overfished stocks will take several decades. Fewer non-groundfish options are available, due to limited entry in other fisheries. Most groundfish permit holders will be willing to pay the nominal groundfish permit renewal fee (regardless of whether they intend to fish for groundfish in the current year) in order to retain the option to fish in future years. Permit holders who are not interested in retaining the groundfish option will likely find a buyer willing to speculate on the possibility that fishing conditions will improve over the long term or on the possibility that government will provide grants and disaster relief. Some vessels will file for bankruptcy; however, most of these boats will simply be returned to the fishery at lower capital values. Given that vessels are much more likely to hold or transfer their permits than allow them to lapse, a significant amount of latent capacity will remain in the groundfish fishery. Thus, even if OYs were to increase, there is no reason to expect an improvement in cumulative landings limits or seasons, since the significant latent capacity already in the fishery can be easily mobilized and keep landings limits low and seasons short. The problems now being experienced in the groundfish fishery will not disappear without a significant reduction in harvest capacity.

IV.C.2. Limited Entry

Participation in the open access fishery has increased over the years by vessels targeting groundfish for niche markets (e.g., the lucrative live fish market). While some type of open access fishery will likely continue to be needed to accommodate incidental groundfish landings, capacity reduction is needed for open access vessels that target groundfish. Limited entry is one option for achieving such reduction.

The existing limited entry fleet is also overcapitalized. Imposing new and more restrictive limited entry requirements on existing limited entry vessels is one option. However, given that reductions in the limited entry fleet will likely be more palatable to the industry if accompanied by some kind of compensation mechanism, buyout and permit stacking programs should also figure prominently in the range of options.

IV.C.3. Buyout

Buyout programs may be government or industry funded, and may apply to permits alone or to both vessels and permits. Because fishery participants generally require less compensation to be bought out of a single fishery than to forgo fishing altogether, a given sum of money can achieve a larger reduction in fleet size if buyout is limited to a single fishery. Thus industry funded programs tend to be fishery-specific, in order to achieve the maximum reduction in capacity for the individuals who are financing the buyout. Government funded programs may have some potential for retiring vessels as well as permits, thereby allaying concerns regarding spillover effects on other fisheries. However, vessel buyout requires a substantial amount of funding and resolution of many complex issues (including some involving other management jurisdictions)[27] in order to be successful.

One potential source of funding for a government funded buyout is disaster relief. However, it is not known whether such funding will be made available for West Coast groundfish. Disaster relief requires Congressional appropriation, with 25% matching funds to be provided by States or other non-Federal entities. About a half dozen requests for such relief have been made for fisheries across the U.S., and there is no guarantee that West Coast groundfish will be a priority.

The business plan for the 1997 trawl buyout proposal is now outdated. Given the recent precipitous decline in groundfish OYs, the original target of a 30% reduction in fleet size may no longer be adequate to ensure an economically viable trawl fishery. Moreover, the affordability of the trawl buyout critically depends on permit prices, which are currently unknown and are not likely to settle into a stable pattern until expectations solidify regarding disaster relief, future groundfish revenues, and future groundfish management policy. The willingness of industry to finance a buyout, and the willingness of government to guarantee that buyout, will likely have to await more definitive information regarding permit prices. It is also not clear whether non-trawl sectors of the groundfish fishery will be willing to consider an industry-funded buyout even after prices stabilize.

IV.C.4. Permit Stacking

As indicated in Section II, cumulative vessel landings limits are widely used in the groundfish fishery as a method of ensuring that harvests do not exceed OYs. Permit stacking has been suggested as a way to alleviate the problem of discards associated with low cumulative limits by allowing vessels holding multiple limited entry permits to harvest multiple cumulative limits. Permit stacking also provides an opportunity to reduce harvest capacity in the fishery by essentially serving as an industry funded buyout without government backing. Depending on the specific provisions of the stacking program, the program may provide incentives for permit holders to develop cooperative arrangements with regard to permit sharing.

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[27] For instance, some State-managed limited entry fisheries have numerical goals for the number of permits in a fishery. Without proper coordination, policies of this type can undermine a buyout program that retired all permits held by a vessel if State managers respond by issuing new permits to replace the retired permits.

Since permit stacking will likely result in the transfer of permits from less active vessels to vessels that are most able to take advantage of an additional cumulative limit, the cumulative limit per permit will have to be reduced to ensure that harvests continue to remain within the OYs. Thus permit holders who do not stack will be placed at a disadvantage relative to their situation under the status quo. Vessels who already hold multiple permits will be able to stack without additional cost, although such cost may have been previously incurred if the permit was purchased from a prior permit holder.

Permit stacking can be voluntary or mandatory. In order for voluntary stacking to be successful at achieving capacity reduction (as well as reducing discards), a significant number of vessels must choose to stack permits. However, the more compelling are the incentives to stack, the lower the cumulative limit per permit is likely to be. Moreover, given the difficulty of predicting the number of vessels that will choose to stack, the success of a voluntary stacking program in achieving a target fleet size will be highly uncertain. Under mandatory stacking, each permit holder will be required to have more than one permit in order to participate in the limited entry fishery, thereby providing much greater certainty of achieving a target fleet size than voluntary stacking. In order to ease the financial burden associated with mandatory stacking, it may be desirable to establish a phase-in period for complying with this requirement.

IV.C.5. Individual Fishing Quotas

Individual fishing quota (IFQ) programs allocate shares of the total OY among individual fishery participants. Although the development of new IFQ programs are under a moratorium, the possible lifting of the moratorium in 2000 means that Council may wish to consider this approach and its implications for long term management of the groundfish fishery .

While limited entry, buyout and permit stacking restrict inputs in terms of the number of vessels that can participate in the fishery, IFQs regulate access to output by designating the share of total quota that each quota holder is eligible to harvest. Because of the relative ease with which IFQs can be disassociated from fishing vessels, debates regarding who is eligible to receive an initial allocation of quota may include not only harvesters but also other types of fishery participants (e.g., processors, crew members). Moreover, because quota shares tend to generate stronger feelings of "ownership" than limited entry permits, the initial allocation of IFQs is typically intense and contentious. Once allocation is accomplished, however, this sense of ownership may serve to enhance the interest of quota holders in the long term sustainability of groundfish stocks and in the fishery management process. Given the personal financial stake that quota holders have in stock assessment results, IFQs may also increase public pressure for more precise stock assessments.

Because IFQ holders are guaranteed a share of the total OY at the beginning of the season, they are in a much better position to set the pace of their own fishing than limited entry permit holders, who are required to stop fishing once OYs become fully utilized. This has a number of implications:

1. Participants in derby fisheries have an incentive to make investments (in electronics, fishing gear, etc.) that allow them to catch as much fish as quickly as possible. This competitive advantage, however, dissipates as other vessels make similar investments, leading to repetitive and wasteful rounds of investment in order to catch the same OY. This type of inefficiency, which occurs under the status quo and can also be expected under capacity reduction programs that restrict numbers of boats (limited entry, buyout, permit stacking), does not occur in IFQ fisheries, because there is no race for fish.

2. Rather than focusing on maximizing the size of their catch (as derby fishery participants do), IFQ holders instead focus on maximizing the value of their quota share. Strategies to increase value (e.g., careful handling of catch, at-sea processing) may provide economic benefits to the industry in the form of higher ex-vessel prices. The incentive to enhance the value of quota shares may also increase the likelihood of discarding and highgrading.

3. IFQ holders can time their groundfish harvests in such a way as to maximize their opportunities in other fisheries. Thus IFQs are likely to lead to greater spillover effects on other fisheries than capacity reduction programs that restrict numbers of boats.

IFQs typically require more detailed monitoring and enforcement than other types of capacity reduction approaches. The amount of quota held by each individual, as well as transfers of quota among individuals in programs where transfer is allowed, must be carefully monitored. If, for instance, the IFQ program allows quota holders to carry overages or underages into the following year, that must be monitored as well. Monitoring becomes significantly more complicated when IFQs are used in multispecies fisheries like groundfish that have separate quotas for individual species. In such cases, species composition must be ascertained on a landing-by-landing basis in order to ensure that each individual IFQ holder is not exceeding his individual species quotas. At-sea observers may be required to ensure adherence to quotas, as well as measure discards. For such reasons, IFQs are easier to design and implement for single species (e.g., whiting, sablefish) than for a multispecies groundfish fishery.

To the extent that IFQs are freely transferable, they tend to facilitate industry adaptation to changing fishery circumstances better than other types of capacity reduction. For instance, as OYs decline in an IFQ fishery, the poundage accruing to each individual quota holder automatically decreases commensurately. This creates an incentive for transfers of quota share from less to more productive IFQ holders until shares become sufficiently concentrated to provide economic viability for the smaller number of IFQ holders that remain in the fishery. Conversely, as OYs increase and the poundage accruing to each quota holder increases accordingly, transfers of quota share allow participation in the fishery to expand to include a larger number of IFQ holders.

It is not uncommon for IFQ programs to include restrictions on the maximum amount of quota share that can be held by individuals, and to ensure a particular allocation of quota among different sectors of the fishery by prohibiting transfers of quota across sectors. However, to the extent that the Council is willing to allow quota transfers across gear types or geographic areas, the Council will have fewer allocation issues to contend with over the long term, since adjustments in allocation will instead be accomplished by transfers of quota in the market.

IV.D. Evaluation of Alternative Approaches to Capacity Reduction

Table IV-1 qualitatively summarizes the potential effects of the alternative capacity reduction approaches discussed in Section IV.C. Each approach is discussed in terms of its immediate feasibility and its potential effects on capacity reduction, long term capacity management, industry efficiency and profitability, discards, management costs, monitoring and enforcement costs and spillover effects on non-groundfish fisheries.[28] All of the effects evaluated here are described as "potential" to highlight the fact that they probably can but will not necessarily be realized, depending on the specific details of the program actually adopted. The table is intended to increase awareness of the full range of potential effects associated with each approach, and should be considered a starting point rather than a definitive evaluation of capacity reduction options. Although each approach is evaluated in isolation, the eventual goal is to encourage discussion regarding how various approaches could be combined in ways that allow the strengths of one approach to offset the weaknesses of another, and vice versa.

Each capacity reduction approach is evaluated relative to the status quo. The status quo pertains not just to the current state of the fishery under the current management approach but also what will likely occur if the current approach is continued indefinitely into the future. The evaluation of buyout programs reflects what would occur if a similar amount of money were available for each type of buyout. The table distinguishes between a government buyout that retires vessels from all fisheries versus one that buys out groundfish permits only. Given the

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[28] Capacity reduction also has the potential to produce significant distributional effects. These distributional effects may pertain, for instance, to different sectors of the groundfish fishery (e.g., harvesters, processors, crew members); different components of the harvesting sector (e.g., limited entry/open access, trawl/fixed gear, open access vessels for whom groundfish represent target species versus incidental catch); different coastal communities, ports, states or management areas; and different individuals in terms of those who remain in versus those who exit the fishery. Many of the specific decisions that are made in the course of designing a capacity reduction program -- e.g., eligibility criteria for participation in the fishery, restrictions on transfers of permits or quota shares, limits on the number of permits or quota shares held by each individual -- are intended to achieve (or avoid) certain types of distributional outcomes. Distributional effects can vary widely, depending upon the specific details of the program being devised. Thus, although distributional effects are an important concern to both the industry and the Council, little can be said about such effects at the level of generality at which capacity reduction is discussed in this document.

likely reluctance of the groundfish industry to finance capacity reduction in other fisheries, the only type of industry funded buyout considered in the table is one that retires groundfish permits. Given the common tendency in existing IFQ programs to restrict transferability of quota shares, the table also demonstrates the differential effects of transferable versus non-transferable IFQs.

The results of the table can be summarized as follows:

Immediate Feasibility: IFQs are not feasible at this time due to a Congressionally imposed moratorium, although that moratorium may be lifted in 2000. Funding for a government financed buyout is not currently available, and it is uncertain whether such funding will be available in the future. It is also not clear whether industry can afford to fund a buyout, given the low OYs and uncertainty regarding permit prices. Nevertheless IFQs and buyout programs are included in this evaluation, based on the possibility that IFQs will become legal, that an industry buyout will be viable and that a government buyout can be funded.

Groundfish capacity reduction: The status quo will not result in any significant capacity reduction, as permit holders are much more likely to retain or transfer their permits than allow them to lapse, even under current depressed fishery conditions. Limited entry and mandatory permit stacking are "command and control" approaches that can be designed to achieve significant capacity reduction. Given that industry will fund a buyout only if it expects it to result in a profitable fishery, an industry buyout -- if affordable -- can also result in significant capacity reduction. Government funded buyouts, which are typically intended as a source of short term financial relief, can -- given sufficient political will -- be designed to achieve some capacity reduction. However, given the difficulty of fully dampening the speculative increase in permit prices that typically accompanies government programs, a government buyout will be less successful at reducing groundfish capacity than a similarly funded industry buyout. A government buyout designed to retire vessels will have a smaller impact on groundfish capacity than a similarly funded government buyout that retires groundfish permits only, since the monetary incentive needed to induce a vessel to retire from all fisheries will be greater than the monetary incentive needed to induce retirement of the vessel's groundfish permit. The success of voluntary permit stacking in achieving capacity reduction is highly uncertain, given the difficulty of predicting the number of vessels that will choose to stack under any given set of circumstances. IFQs are similar in some respects to the cumulative landings limits already used in the groundfish fishery, except that IFQ shares (unlike landings limits) vary across individual vessels. Non-transferable IFQs will produce modest capacity reduction, at best, and only to the extent that the number of vessels receiving initial IFQ allocations is smaller than the number of vessels participating in the fishery under the status quo. Transferable IFQs may produce significant capacity reduction as quota shares are transferred from less to more efficient producers. However, capacity reduction will likely occur at a slower rate with transferable IFQs than with limited entry, buyouts or permit stacking.

Long term groundfish capacity management: Effective long term capacity management requires that industry be provided with incentives to efficiently adjust capacity in response to changes in technology, markets and resources. A necessary condition for facilitating industry adjustments is that the fishing privilege be freely transferable. For this reason, non-transferable IFQs are no more likely to achieve capacity management than the status quo. Transferable IFQs, which allow quota holders to adjust capacity in response to changes in economic and harvest conditions, are well suited to long term capacity management. Programs that regulate inputs (e.g., limited entry, permit stacking, buyouts) rather than outputs are intended, by design, to restrict the ability of permit holders to change the existing level of capacity; they are therefore less conducive to achieving long term capacity management than transferable IFQs. However, an input control program that incorporates transferable permits can at least facilitate movement of existing harvest capacity among fishery sectors in response to changing conditions. Input control programs can also contribute to capacity management by incorporating features (e.g., trip limits) that effectively discourage the race for fish and the wasteful capital stuffing resulting thereof.

Groundfish fishery efficiency and profitability: The success of a capacity reduction approach in enhancing industry efficiency and profitability will be correlated with its success in achieving capacity reduction. On this basis, the status quo and non-transferable IFQs are least likely to enhance groundfish profitability. Efficiency and profitability will be somewhat higher under government sponsored vessel retirement or voluntary permit stacking, and even higher under limited entry, mandatory permit stacking and government or industry buyout of groundfish permits. The potential for enhancing profitability is highest for transferable IFQs, since the incentive to race for fish is replaced under IFQs with the opportunity and incentive to enhance the value of quota shares.

Discards: Capacity reduction is needed to reduce discards associated with currently low cumulative landings limits. In other words, the success of a capacity reduction approach in reducing discards will be correlated with its success in achieving capacity reduction. With regard to input control approaches, discards will be somewhat lower under government funded vessel retirement or voluntary permit stacking, and even lower under limited entry, mandatory permit stacking and government or industry buyout of groundfish permits. Discards are likely to be no lower under non-transferable IFQs than they are under the status quo. If IFQs are transferable, the potential for discards may diminish as quota shares become consolidated among fewer quota holders. However, this tendency may be offset by the incentive for highgrading.

Groundfish management costs: Excess capacity in the groundfish fishery is undermining the effectiveness of traditional management measures, and the Council has adopted increasingly complex measures to prevent further erosion of landings limits and seasons. Given the contribution that capacity reduction can make to reducing management complexity, the success of a capacity reduction approach in reducing management costs will be correlated with its success in achieving capacity reduction. Non-transferable IFQs will likely result in management costs similar to the status quo. Management costs will be somewhat lower under government sponsored retirement of vessels or voluntary permit stacking, and even lower under limited entry, mandatory permit stacking, and government or industry buyout of groundfish permits. Transferable IFQs will be even less burdensome and costly for the Council over the long term than approaches based on input controls, since transferable IFQs remove the competitive incentive for capital stuffing, allow capacity to adjust to changes in OYs and provide market solutions to allocation issues.

Groundfish monitoring/enforcement costs: Monitoring and enforcement costs are partially a function of management complexity, which is in turn affected by the degree of overcapitalization in the fishery. In other words, the success of a capacity reduction approach in reducing monitoring/enforcement costs will be correlated with its success in achieving capacity reduction. These costs are likely to remain as high under non-transferable IFQs as they are under the status quo. Monitoring/enforcement costs will be somewhat lower under government sponsored retirement of vessels and voluntary permit stacking, and even lower under limited entry, mandatory permit stacking, and government or industry buyout of groundfish permits. Transferable IFQs have the potential to generate significant monitoring/enforcement costs, given the need to monitor each IFQ holder's quota availability and quota use, and track quota transfers across individuals. This task becomes particularly burdensome if tracking must be done for individual species caught in multispecies complexes.

Spillover effects: The low cumulative landings limits and other regulatory restrictions that characterize the status quo provide an incentive for existing groundfish permit holders to seek alternative opportunities in non-groundfish fisheries. Limited entry, voluntary or mandatory permit stacking, and government or industry funded buyout of groundfish permits all have the potential to exclude some groundfish participants, who will subsequently become fully committed to non-groundfish fisheries. Conversely, however, those who remain in the fishery may be more likely to specialize in groundfish and less likely to diversify into other fisheries. Given the difficulty of predicting the spillover effects associated with these approaches relative to the status quo, they are all considered to be indistinguishable for purposes of the table. Government funded vessel retirement will result in less spillover than any other approaches, since it removes vessels from other fisheries as well as from groundfish. IFQs, because they allow quota holders to time their groundfish harvests to enhance their fishing opportunities in non-groundfish fisheries, will provide greater opportunity for spillover than the other approaches.

IV.E. Conclusions and Recommendations

- ***Overcapitalization is the single most serious problem facing the West Coast groundfish fishery.***

  Harvest capacity in the groundfish fishery is exceedingly high relative to OYs. This overcapitalization is making it increasingly impossible for the Council to achieve the biological and economic objectives of the Groundfish FMP. The effectiveness of traditional management measures (e.g., landings limits, seasons) in ensuring that discards are minimized and that a reasonable economic livelihood can be made from the groundfish fishery has been seriously eroded in recent years. Management has become increasingly complex and contentious as the Council attempts to allocate the low OYs equitably among fishery sectors.

- ***The problems associated with overcapacity will not be resolved by waiting for vessels to leave the fishery.***

  Given the ever-present potential for entry into the open access fishery and the propensity of limited entry permit holders to retain or transfer their permits rather than allow them to lapse, the amount of latent capacity in the groundfish fishery is likely to remain high. This capacity will be available for mobilization at any sign of improved fishing opportunities. Fishing effort can easily outpace OYs, even if the OYs increase to much higher levels (an unlikely scenario). The current problems associated with low landings limits, short seasons and complex and contentious management will not go away unless the Council takes deliberate action to permanently remove latent capacity from the groundfish fishery.

- ***There are no quick or easy fixes for the problems caused by excess capacity.***

  Capacity reduction should not be viewed as just another type of management measure. It is an essential element of a broader strategy to enhance management effectiveness and reduce management complexity. Eliminating excess capacity will be complex, costly and time consuming, regardless of which capacity reduction approach or combination of approaches is used. However, the status quo is also complex, costly and time consuming, and provides no solution to excess capacity and its associated problems.

- ***The Council should take immediate action to develop stringent capacity reduction programs for all sectors of the West Coast groundfish fishery.***

  The need to address groundfish overcapacity is urgent. Potential solutions, including limited entry for the open access fishery and buyouts and/or permit stacking for the limited entry fishery, should be subject to immediate consideration. Given the current moratorium on IFQs and the potentially complex design requirements of IFQ systems, IFQs are best viewed as a long term management strategy for West Coast groundfish.

- ***The Council should establish clear goals and objectives for capacity reduction in each fishery sector, and should incorporate design features into the program that provide a realistic basis for achieving those objectives.***

  Goals and objectives have a direct bearing on the design of a capacity reduction program and the measures used to monitor "success" of the program. It is therefore critical that goals and objectives be clearly defined at the outset. Goals and objectives may be different for different sectors of the fishery.

  The design features of a capacity reduction program will have a direct bearing on progress toward meeting its objectives. For instance, if the objective of an IFQ program is to provide a long term, self-adjusting solution to the overcapacity problem, quota holders must be allowed to adjust quota shares in response to changes in OYs, technology or markets. Restrictions on transferability of quota shares (across gear types, vessel size classes, geographic areas, etc.) will undermine the program's ability to meet that objective.

  If an effort based approach (e.g., buyout, permit stacking) is being considered to achieve a target level of capacity reduction, it is important that the program include provisions to discourage capital stuffing (e.g., trip limits, restrictions on permit transfers based on vessel "size"). It is also important to recognize that, while such provisions may discourage the amount of capital stuffing that occurs, they will not eliminate the incentive for fishermen to seek ways to engage in capital stuffing.

- ***The Council should consider using different capacity reduction approaches for different sectors of the fishery, and using a combination of approaches within a given sector.***

  For instance, although IFQs are not legally feasible at this time, the Council may wish to consider IFQs as a potential long term groundfish management strategy. If so, it should be noted that capacity reduction programs such as permit stacking and buyouts are not inconsistent with IFQs, should the IFQ moratorium ever be lifted. Particularly in severely overcapitalized fisheries like West Coast groundfish, removal of latent capacity may: (1) be a desirable precursor to IFQs, (2) help ensure that the initial IFQ allocations go to active fishery participants and (3) enhance the "efficiency" of quota transfers once the initial allocations are made by reducing the number of small quota transactions that would occur as marginal participants cash out of the fishery. It is also important to note, however, that justifying a "lenient" permit stacking or buyout program on the basis that it is merely an intermediate step toward IFQs (rather than as an ultimate end in itself) poses the risk of ending up with an inadequate permit stacking/buyout program if IFQs are not actually implemented.

- ***Given that sufficient funds for a buyout program will probably not be available from any single source, the Council should investigate combining government, industry and other sources of funding.***

  Experiences in other fisheries indicate that, for highly capitalized fisheries experiencing resource depletion, government sponsored buyouts tend to focus primarily on disaster relief and wealth transfer from the public to the private sector. The prospect of transfer payments creates an incentive to inflate permit and vessel values and encourages speculation. As a result, such programs tend to generate modest reductions in capacity. By contrast, industry sponsored programs tend to be more successful in achieving capacity reduction, since industry will only support a buyout program and associated management adjustments if they expect the outcome to be a profitable fishery. Extensive industry involvement will be critical to the success of any buyout program considered by the Council.

  This is not to say that government funding should not be pursued. It may be possible to temper the price inflation and speculation that often occur with government buyouts by adopting an appropriate bidding system (e.g., capping the permit purchase price). Even if government funding is sufficient to finance only an incremental reduction in capacity, that reduction will still bring the fishery closer to the Council's capacity target. It may also create more favorable circumstances for achieving a meaningful long term solution to the problem by "weeding out" some of the more marginal participants in the fishery. Overcapitalization is currently so high as to jeopardize the ability of affected parties to engage in meaningful discussion, much less come to compromise or consensus.

  At this time, it will be useful to re-evaluate the business plan prepared in 1997 for the trawl buyout and prepare similar plans for other sectors of the fishery. These business plans will provide a means for evaluating the affordability of capacity reduction targets designated by the Council. Sources of cost uncertainty should be identified and factored into the analysis. Given that sufficient funds will probably not be available from any single source to achieve significant capacity reduction, the cost estimates can nevertheless serve as a starting point for evaluating whether funding from a variety of sources can be combined in such a way as to achieve the desired result.

  Some approaches that could be considered include: (1) converting the government grant to a loan fund (if legally permissible) and using the loan repayments to support long term cooperative research, co-management, or observer programs; (2) using the grant portion of a buyout plan to purchase (and scrap) vessels, while using government guaranteed loans (or industry loans using Capital Construction Fund dollars) to retire and/or stack permits; and (3) if grants are inadequate to significantly reduce capacity, using government guaranteed loans to purchase some proportion of permits from the fleet, combined with either mandatory "point reduction" to achieve specific targets or with a longer term market based "point capacity management system".[29]

- ***Long term allocation decisions must be made to ensure that the benefits of capacity reduction accrue to those who bear the costs.***

  Allocation will remain a contentious issue under each of the capacity reduction approaches discussed here. Buyouts, permit stacking (which is essentially an industry funded buyout without government backing) and IFQs all require that someone (industry, government or both) make financial decisions on the basis of their expectations regarding future harvests, markets and regulations, and that they assume the risk associated with erroneous expectations. A major element of this risk pertains to how much of the groundfish OYs each sector (including recreation) can expect to receive each season. Resolution of this issue through long term allocation decisions is necessary to ensure that capacity reduction will be acceptable to those who will pay for it.

- ***While spillover effects on other fisheries are a legitimate and serious concern, they are not an adequate justification for ignoring the overcapitalization problem in the groundfish fishery.***

  Capacity reduction programs such as buyouts can be designed to minimize spillover by including a requirement that vessels be scrapped. However, the cost of scrapping a boat may be significantly higher than the cost of retiring it from a single fishery. Given funding limitations, the Council will likely be faced with the prospect of retiring a smaller number of vessels from all fisheries versus retiring a larger number of vessels from the groundfish fishery only. The magnitude and distribution of benefits and costs will likely be very different with these two different approaches.

  Given the various government jurisdictions associated with management West Coast fisheries, any capacity reduction approach that involves scrapping vessels will require extensive coordination between State and Federal management entities. Such coordination will likely be complex and the outcome uncertain relative to a program that focuses on groundfish capacity reduction only. However, scrapping vessels also has the potential to provide long term benefits to West Coast fisheries as a whole.

[29] The West Coast limited entry groundfish fishery uses a "point" system to determine permit price per vessel class-size. The existence of the point system provides one avenue to reduce overall capacity by requiring each permit class to "retire" some proportion of points and repurchase points (in a point-based market) in order to remain in the fishery.

Capacity reduction approaches that involve retiring vessels from groundfish only will almost inevitably result in some spillover into other fisheries. Given the flexibility afforded by IFQs with regard to the timing of harvest, the potential for spillover is probably greater for IFQs than for other approaches. However, some spillover can be expected regardless of which capacity reduction approach is adopted, including the status quo. While spillover is a legitimate and serious concern, the groundfish fishery should not be held hostage to inadequate capacity regulation in other fisheries.

Table IV-1. **Potential** effects of alternative capacity reduction approaches **relative to the status quo**.

	Immediate Feasibility	Groundfish Cap Reduction	Long Term Groundfish Cap Mgmt[2]	Economic Efficiency and Profitability	Groundfish Discards	Groundfish Management Costs	Gr Monitoring &Enforcement Costs	Spillover Effects
Status Quo	YES	NONE	NONE	LOW	HIGH	HIGH	HIGH	SOME
Govt Buyout (Vessel Retirement)[3]	Maybe	Some	Some	Somewhat higher	Somewhat lower	Somewhat lower	Somewhat lower	Lower
Govt Buyout (Gr Permits Only)[3]	Maybe	More	Some	Higher	Lower	Lower	Lower	Same as status quo
Industry Buyout (Gr Permits Only)[3]	Maybe	Most	Some	Higher	Lower	Lower	Lower	Same as s.q.
Limited Entry	Yes	Most	Some	Higher	Lower	Lower	Lower	Same as s.q.
Permit Stacking (Mandatory)	Yes	Most	Some	Higher	Lower	Lower	Lower	Same as s.q.
Permit Stacking (Voluntary)	Yes	Some	Some	Somewhat higher	Somewhat lower	Somewhat lower	Somewhat lower	Same as s.q.
IFQs (Non-transferable)	No	None/some	Same as status quo	Same as s.q.	Same as s.q.	Same as s.q.	Same as s.q.	Higher
IFQs (Transferable)	No	Most (not immediate)	Most	Highest	Don't know	Lowest	Higher	Higher

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